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POPULAR MECHANICS MAGAZINE

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See Page 705

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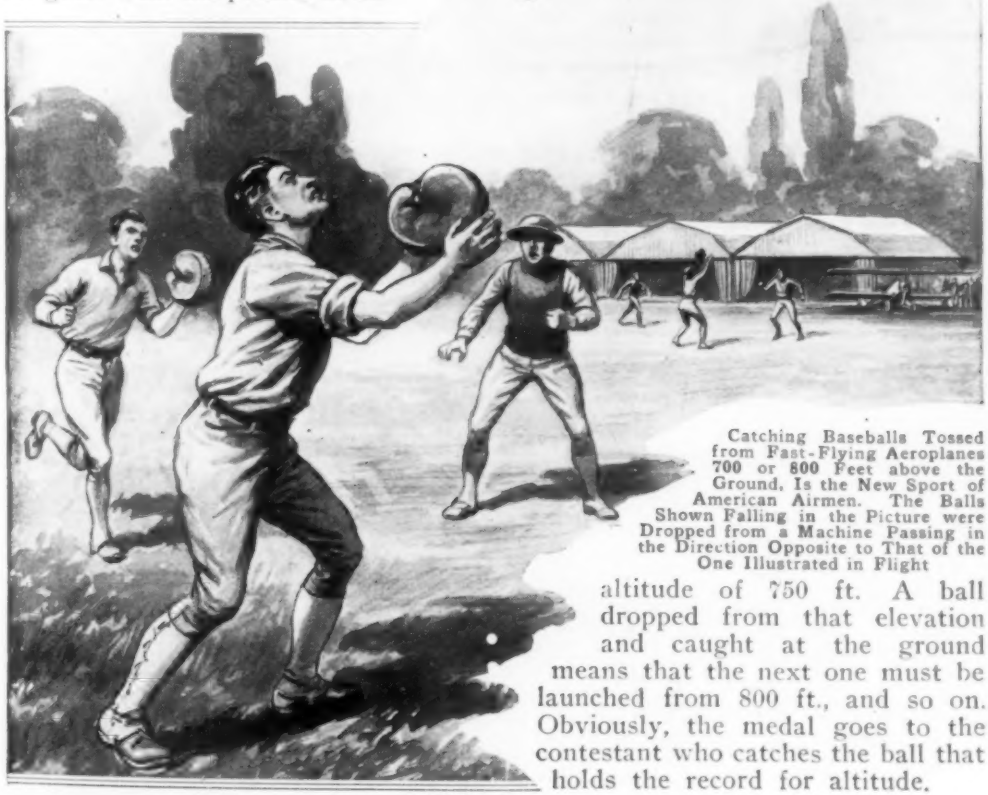
Vol. 30 NOVEMBER, 1918 No. 5

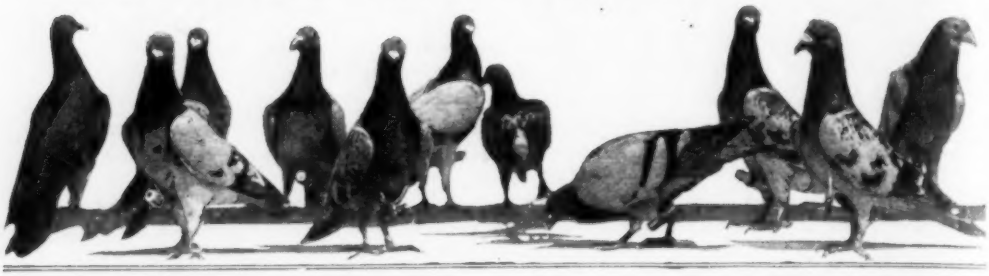
Aerial Baseball New Game for Yankee Fliers

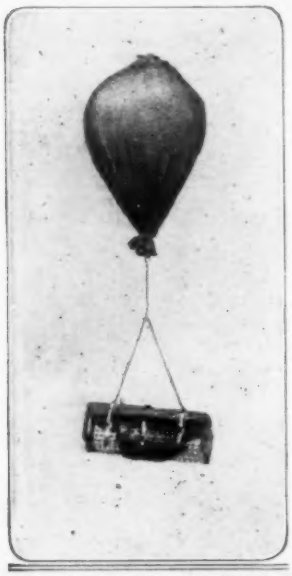
AIRMEN at one of the flying fields in the South devised a new sport some weeks ago, and now word comes from abroad that Yankee "sky pilots" over there are adding frills to it. The game, incidentally, seems to be most excellent practice for baseball outfielders. As originally devised, it consisted in endeavoring to catch baseballs dropped from an aeroplane flying at an elevation of 700 ft. As revised by the overseas force, it includes the award of a world's championship medal "and everything." To go the home crowd one better, the oversea men began the game with the pitcher at an altitude of 750 ft. A ball dropped from that elevation and caught at the ground means that the next one must be launched from 800 ft., and so on. Obviously, the medal goes to the contestant who catches the ball that holds the record for altitude.



Catching Baseballs Tossed from Fast-Flying Aeroplanes 700 or 800 Feet above the Ground, Is the New Sport of American Airmen. The Balls Shown Falling in the Picture were Dropped from a Machine Passing in the Direction Opposite to That of the One Illustrated in Flight

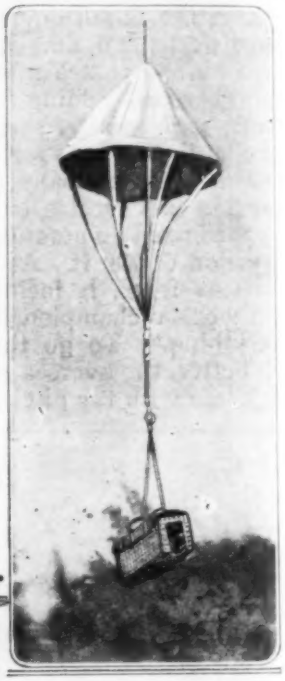
SENDING CARRIER PIGEONS BY BALLOON





Successful Use of Small Balloons for Conveying Carrier Pigeons to Marooned Troops Depends Largely upon the Condition of the Wind and the Accurate Estimate of Its Velocity

THROUGH the efforts of a pigeon fancier, facilities have been devised for increasing the usefulness of feathered messengers in war. Light-weight wire cages, each just large enough for one pigeon, are among the things that compose the equipment. The cages carry grain for the birds, and pencils and paper for marooned dispatch writers. They are attached to small balloons that are used when wind conditions are favorable, and also to parachutes designed to be dropped from low-flying aeroplanes. On the other hand, several of



The Pigeon-Bearing Cages, Attached to Parachutes, may be Dropped from Aeroplanes and Communication Established, at Least to a Degree, with a Unit That Is Out of Touch with Headquarters

The Mobile Loft for Use at the Front: It Accommodates 75 Pigeons and Is the Base to Which the Birds Return with Messages from the Field. Wire Cages in Which the Pigeons are Carried are Strapped to the Dogs Shown Here. In Addition to Containing Grain for the Birds, They Hold Writing Materials

PHOTOS BY EDWIN LEVICK

them may be strapped to a trained dog and conveyed by him to the desired point. All of which is for the purpose of establishing communication with detachments that become cut off from the main body of troops and, while resisting capture, have no means of immediate escape without outside assistance. Small balloons, timed to descend in a prescribed number of minutes, are intended for use when all conditions are favorable and the location of a unit to be reached is fairly well known. Under other circumstances, as, for instance, when the position of a detached body of men must be established by scouting, aeroplanes frequently are best suited for the work. It is then that the parachutes are employed. The wire cages are arranged so that the birds may be fed without being removed from them, and, furthermore, messages may be inserted in the pellets the pigeons carry without the latter being handled, or even touched. A mobile loft in which the birds normally are kept, has provisions for 75 carriers and is the base to which the birds return.

PHOTOS BY EDWIN LEVICK

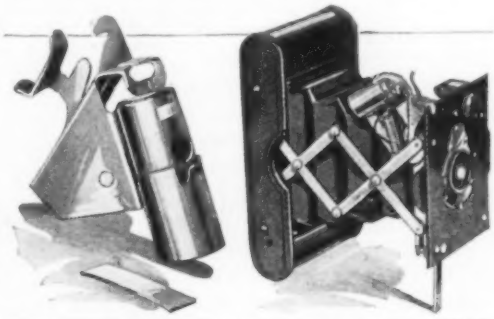
The Picture at the Left Illustrates How a Message may be Inserted in the Pellet without the Bird being Handled. The Other Photograph Shows Where Pencil and Paper are Held within the Cage

TEUTONIC FIGURE TO LOSE PLACE ON CUSTOMHOUSE

The statue of Germania, which is one of 12 figures representing ancient and modern nations above the main cornice of the New York customhouse, is to be transformed into a figure representing Belgium, the Treasury Department having decided that a symbol of the enemy country is not a fitting adornment for a Federal building

CAPILLARY DEVICE MAKES CAMERA SELF-OPERATING

Capillary attraction is utilized in an ingenious device that actuates the shutter of a camera and permits the operator to include himself in the pictures he takes. A small cylinder at the top of the instrument contains water and exposes a wick. A spring lever is "cocked" like the hammer of a rifle and held against motion by the insertion in a slot of a blotting-paper fuse, one end of which is brought in contact with the wick. It requires about 20 seconds for moisture to travel the length of the fuse and soften it so that the lever is released. The latter swings back, striking the plunger of the cable release to which the device is attached—of the shutter lever itself, in the case of a small vest-pocket instrument that uses no cable release—and thereby causing the shutter to be tripped.



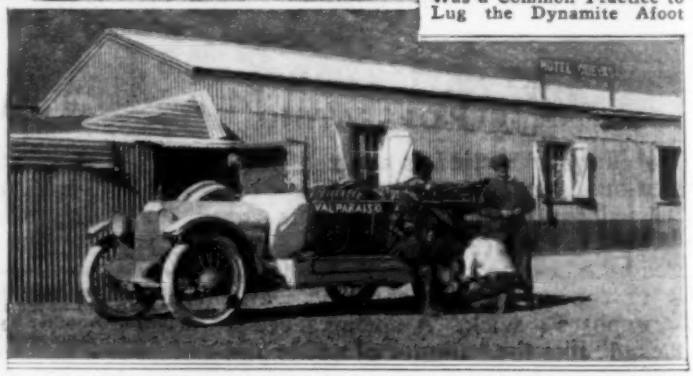
The Shutter-Operating Device is Shown in Detail at the Left, and at the Right, Attached to a Vest-Pocket Camera. Another Type is Provided for Instruments Equipped with Cable Releases

HIGH ANDEAN TRAILS TEST MOTORISTS TO LIMIT

It is all very well to plan on paper a motor trip through the Chilean Andes, but it is quite another matter to pilot a car over the "trailless" trails that one must follow. At least this is the sense of one adventurous group after completing a 2,700-mile tour across Argentina from Buenos Aires to Concepcion and return. The trip, although one of marvelous interest in many respects, proved to be a constant battle against heavy odds on untraveled mountain trails, across swift-flowing bridgeless streams, and through far-reaching sand dunes. As an example of the incidents of the tour, it was necessary to ford Rio Limay on a raft. At the point where the crossing was made, the water ranges from 15 to 20 ft. in depth, and the current is very swift. As the car started to climb from the raft to the bank, after being safely piloted across the stream, the pull of the rear wheels broke the ropes, causing the raft to float out and the machine to drop into the water. Some one with quick wits managed to pass a rope around the front axle in time to save the

Two-Ox-Power Assistance Plus Block and Tackle Saved the Day —and Likewise the Car, Which Came Unpleasantly Near Meeting Disaster in the Swift, Deep Water of the River

When Bumping across "Bottomless" Gorges on the Ties of Railway Trestles, It Was a Common Practice to Lug the Dynamite Afoot



The Location of the Sheet-Iron Hotel Cuevas is Not Mentioned, and Perhaps No One Cares to Know It Anyway. Nevertheless It Was a Welcome Halting Place for the Trail-Worn Motorists of the Chilean Andes

One of the More Pretentious Floating Theaters Which Are a Source of Particular Interest to Persons Remote from the Great Inland Waterways: This Vessel and Its Towboat Have Living Accommodations for a Large Troupe and a Crew

situation. Oxen were then enlisted, and finally, with the aid of block and tackle, the car was drawn to dry ground. From there on the motorists encountered washouts, sand hills, and stiff grades, and many times it was necessary to call upon ox teams for help. Dynamite was carried to blast bowlders from the path of the machine in particularly rocky stretches. This, of course, was painstakingly carried afoot when deep mountain gorges were crossed by piloting the car over the ties of high railway trestles.

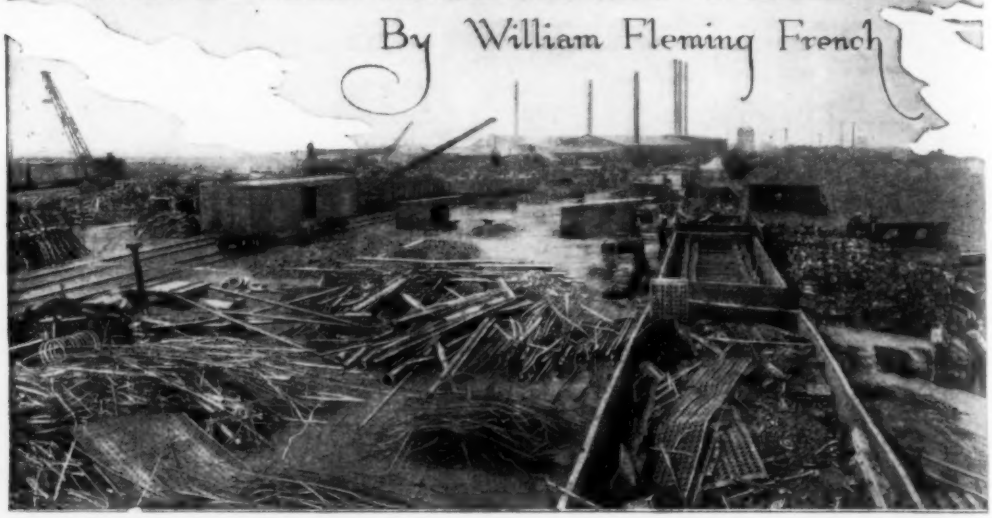
FLOATING THEATER PLIES GREAT INLAND RIVERS

A type of amusement center which is wholly unknown in many parts of the country, but is frequently seen on the great inland waterways, is the floating theater or hippodrome. A particularly large river boat of this kind, which plies the Ohio and Mississippi rivers from spring until late in the fall, is almost wholly occupied by theater facilities, while the players and crew find accommodation in a smaller boat which tows the larger one and supplies it with steam heat, electricity, and water. The lower deck of the big barge is occupied by the main floor of the theater, while even with the second deck is a gallery. On this level, also, are several staterooms Additional sleeping quarters as well as dining quarters are found on the smaller craft. A few weeks or months on boats of this character afford many theatrical people a leisurely trip which is an enjoyable contrast to the more strenuous winter engagements. Like the circuses these itinerant shows make many towns in a season, advertising chiefly with music and daily parades.

¶The wings of a German aeroplane, which recently landed in Holland, were, according to report, covered with a thin layer of wood, three-ply, instead of fabric—a fact which seems to indicate the seriousness of Germany's textile shortage. Extra weight in the wings was saved by eliminating the wire stays.

SAVING THE RAILROADS' MILLIONS

By William Fleming French



General View of the Santa Fe's "Scraptown," a Wonderful Reclamation Plant in Which Most of the Accompanying Photographs were Taken: During 1917 These Yards Reclaimed Over $1,500,000 of First-Class Material, Besides Selling Over $3,500,000 Worth of Scrap

IN spite of the fact that the United States government has found railroading a most perplexing and expensive experiment (our first year of government control being anything but a profitable one), the railroad administration is beginning to get a firm grip on the situation, and truly do things in a big way. And the scheme upon which they are now working promises wonders along the line of conservation and economy, as it will save the railroads a matter of some $25,000,000 a year on scrap material alone.

Just how vitally important such an accomplishment will be is indicated by the fact that, due to war demands, the railroads as well as all industrial concerns, will be required to get along with considerably less raw materials than they actually need. A 25-per-cent shortage of steel is estimated for 1919, a 40-per-cent shortage of zinc, and about a 50-per-cent shortage of tin. All other materials, such as leather, cloth, oils, wood—in fact practically everything that the railroads use—will show decided shortages. During the average year the railroads of the United States spend over a billion dollars on raw materials, about 20 per cent of which will not be obtainable during 1919. At the old figures this would mean a short-

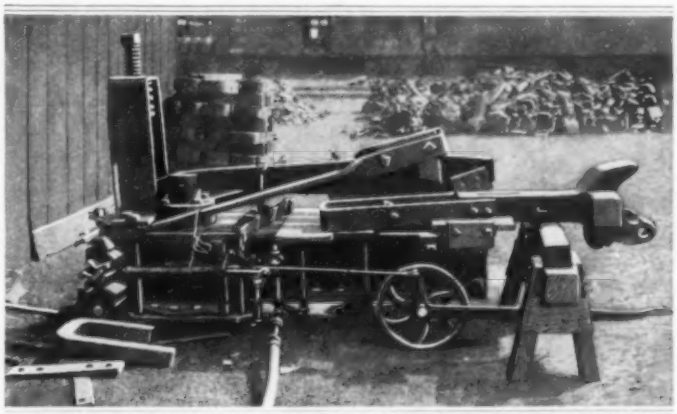
Shears with Which the Old Bent Rods, Shown at the Left, are Cut into Short Lengths to be Made into Bolts: This Is But One of Many Reclaimed Machines with Which Vast Sums are Saved for the Railroad

age of over $200,000,000 worth of raw materials needed by the railroads.

Realizing the necessity of supplying the roads with materials and equipment, the administration viewed this situation with grave fears, and set about to find a remedy. This was discovered in the railroad scrap pile—for if new materials could not be had, old ones would have to serve. In 1917, the scrap from the railroads of the United States sold as junk for over $70,000,000. If this material was worth so much as scrap, certainly it would be worth twice that when reclaimed, thus practically making up the shortage in raw materials. Then economy could do the rest.

So the railroad administration, through its regional purchasing committees, has issued an order to all the railroads of the United States, instructing each road to appoint a reclaim committee, whose duty it will be to arrange for the reclaiming of all usable scrap; and requesting, at the same time, that all roads give full details as to their methods of scrap reclaiming, and also offer suggestions for the improvement of these methods and new ideas along the same line.

Saving $25,000,000 a year on scrap alone is a large order, but figures prove that if the best utilization and reclaim methods of two or three different progressive roads be incorporated into the operating practices of every railroad in America, this amount will be saved, besides putting back into service scrap that will replace at least five times that amount in raw materials.



Coupler Shears Used by the Chicago, Milwaukee and St. Paul Railroad in Connection with Its Reclaiming of Car Parts Which are Subject to Particularly Severe Usage

And that is exactly what the United States railroad administration plans to do. The best methods worked out by the various reclaim committees will then be adopted for general use on all the railroads of America.

Nor is the administration jumping to

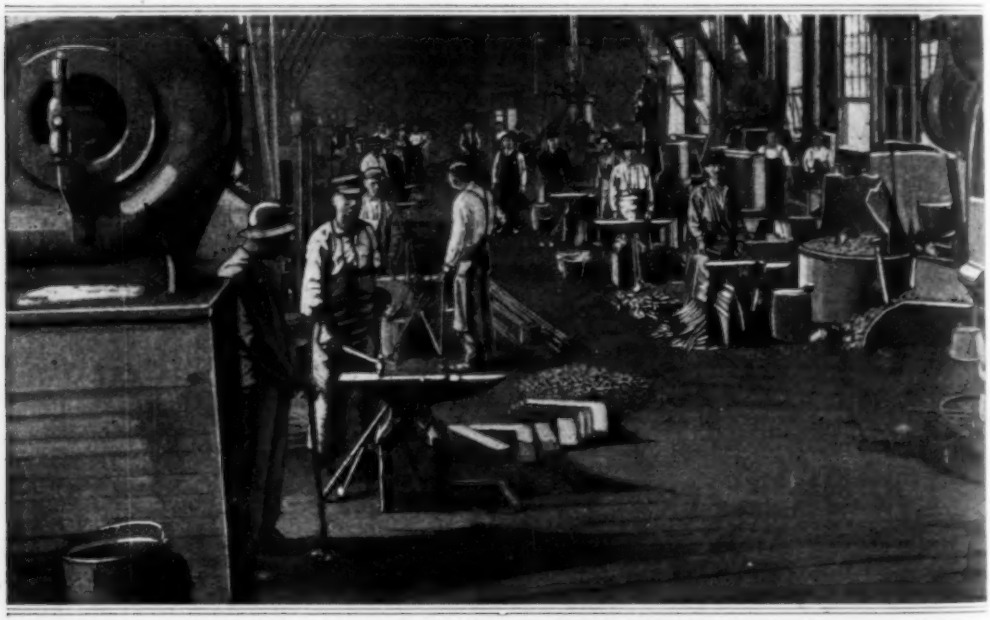
A Receiving Pile: In the Foreground, at the Left, Are Brake Beams, and at the Right Are Angle Bars. Each Sorter Has a Can in Which He Places the Loose Nuts Found

this conclusion blindly; it has a very practical and successful example to lead the way.

The Santa Fe road last year reclaimed, from the scrap pile at their Chicago yards, $1,594,057.39 worth of material and tools at a cost of $1,075,973.11, showing a net profit, after deducting the value of the material used and all costs incident to its reclamation, of $518,084.28. And during the same year, this road sold as junk over $3,000,000 worth of scrap. And this was accomplished after having reduced the percentage of usable scrap sent to the yards from 60 per cent to 8 per cent. In other words, when the originator, developer, and perfecter of the scrap-saving scheme employed by the Santa Fe first took hold, 60 per cent of the materials and tools sent in as scrap were usable. But by strenuous methods and campaigns, he put the fear of his wrath into the workers of the road and reduced that percentage to about eight. And it is acknowledged that the same results could be obtained with pretty nearly all other roads in the country.

A Corner in the Tin Shop, Where "Worthless" Car Roofing is being Made into a Hundred Different Kinds of Valuable Railway Equipment: The Profits from This Shop Were $7,000 Net, Last Year

All this means that when the scrap-saving system was first adopted only 40 per cent of the materials scrapped were real junk and 60 per cent could be reissued from stock with little or no repairing, while today over 90 per cent of the materials received as scrap are properly classed so. And from that 90 per cent the road is now saving over a half million dollars a year. On top of this, it is freely admitted that with a little additional equipment the 1917 record for scrap reclaiming and the 1917 net profit on that work could be doubled. The pe-

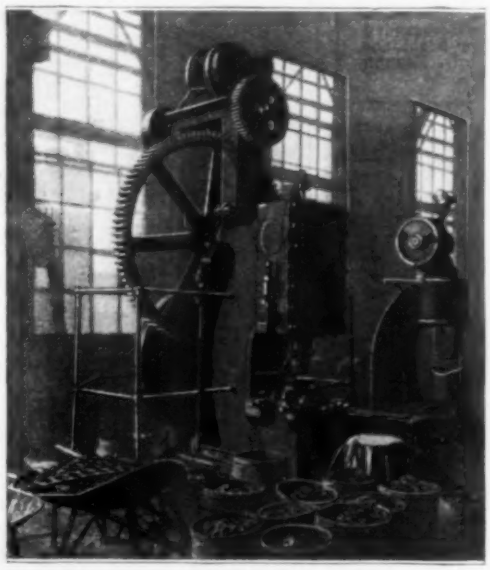


Blacksmith Shop, in Which Much of the Equipment Is "Homemade": The Forges, for Example, are Constructed from the Lower Sections of Old Engine Smokestacks, with Reclaimed Grates and with Shields Made from Scrap Boiler Plate. Here Couplers are Straightened and Otherwise Repaired; Springs of All Sizes Retempered, Tested, and, Whenever Possible, Used Again

culiar thing about this is that other railroads, such as the Chicago, Rock Island & Pacific and the Southern Pacific, have specialized in lines of scrap reclaiming and utilization that the Santa Fe has not even touched. Therefore it is reasonable to believe that a combination of every method evolved by the different roads of the country, when put in force on every railway in America, will make an amazing showing, especially in view of the fact that there are more than a score of railroads that have done positively nothing in the way of scrap reclaiming and utilization, and still others that have done practically nothing.

While credit and recognition is due to the half dozen other roads that have gone far along the road of scrap reclamation, nowhere in the world can a duplicate of Corwith, the Santa Fe's Chicago scrap town, be found. Corwith, however, is but one of the Santa Fe's reclaiming shops, a large rail, frog, and switch mill, and repair shop being maintained at Newton, Kansas.

During 1917, the Corwith yards received nearly 75,000 tons of scrap, from which they reclaimed over $1,500,000 worth of first-class materials and tools, besides selling more than $3,500,000 worth of scrap, most of it classified and sorted so as to bring about 50 per cent more than if it had been sold "en masse," or as unsorted junk. How hundreds of thousands of dollars are yearly saved by this sorting process will be explained later in this article.



The Washer Cutter, Which Stamps Two Washers from Flattened Boiler Flues with Every Stroke: The Punched Flues in the Wheelbarrow will be Taken to the Roller Mill to be Made into Bar Iron

Yet this road claims only the actual saving that they make by manufacturing their own materials and tools from junk, as against what they would cost if purchased. In other words, they manufactured $1,500,000 worth of materials and tools at a cost of approximately $1,000,000—including the cost with which they credited their operating department for the junk received—thus saving $500,000, besides innumerable delays, freight charges, and other incidentals.

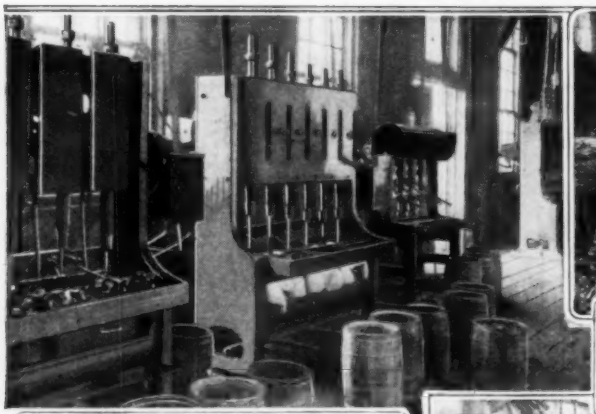
And, in spite of this remarkable showing, the department head in his report to the United States railroad administration calls attention to the fact that to date he has only "scratched the surface," and that with the securing of additional equipment, he can reclaim a much larger percentage of the scrap received. When asked what per cent of the miscellaneous scrap that came into the yards was finally classed as "waste," unsalvable or unsalable junk, he replied:

"So small a part of one per cent that it might better be expressed in pounds." Nor did he exaggerate the facts! One of his assistants said: "About the only 'waste' that I know of is the rust we rattle off the spikes, bolts, and nuts." And from my trips through this gigantic scrap-reclaiming plant I'm prepared to say that rust was the only sort of waste I ever saw there.

Before Corwith, or "Scrapville" as it is commonly known, came into being, this road followed the usual practice of having its scrap dumped into empty cars and shipped to a division point where it was disposed of as mixed scrap, selling at about $10 a ton. Thus a 40-ton car of mixed scrap brought the road $400, whereas, after being separated and sold according to the proper classifications, it brings not less than $1,000, often considerably more.

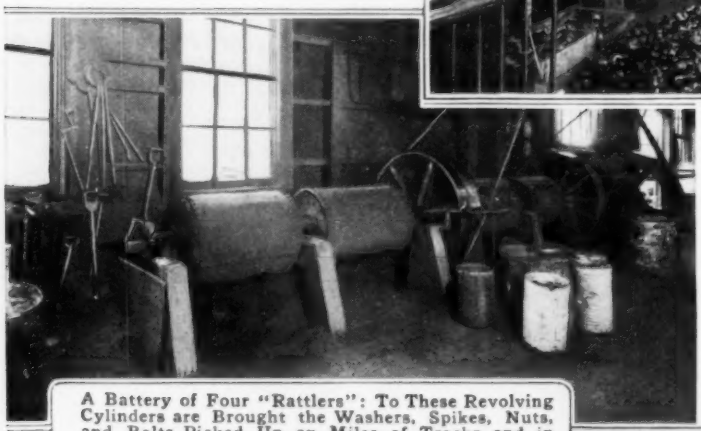
The next step, after learning to separate the scrap into its various classes, was to systematize the gathering of it. This was done by arranging to have the work train, whose principal purpose is to distribute needed material and supplies along the line, pick up the scrap on its return trip. Next came the shipping of all this scrap to Corwith, where it could be handled in large quantities, and the best prices for it obtained. To eliminate the cost of freight, the shipments of scrap were made in foreign cars (cars belonging to other roads) which were being sent back empty to Chicago. This not only eliminated the freightage cost, but also prevented a levy on the road's own supply of cars.

When received at Corwith the scrap is weighed in, and the division stores forwarding it are given credit. Then it is unloaded by locomotive cranes, equipped with powerful magnets, and dumped into a receiving pile preparatory to sorting. As it is sorted, an inspector carefully goes over it, searching out material that is serviceable. If any is found, the division store from which it comes is notified and warned to see that all usable material is separated before the



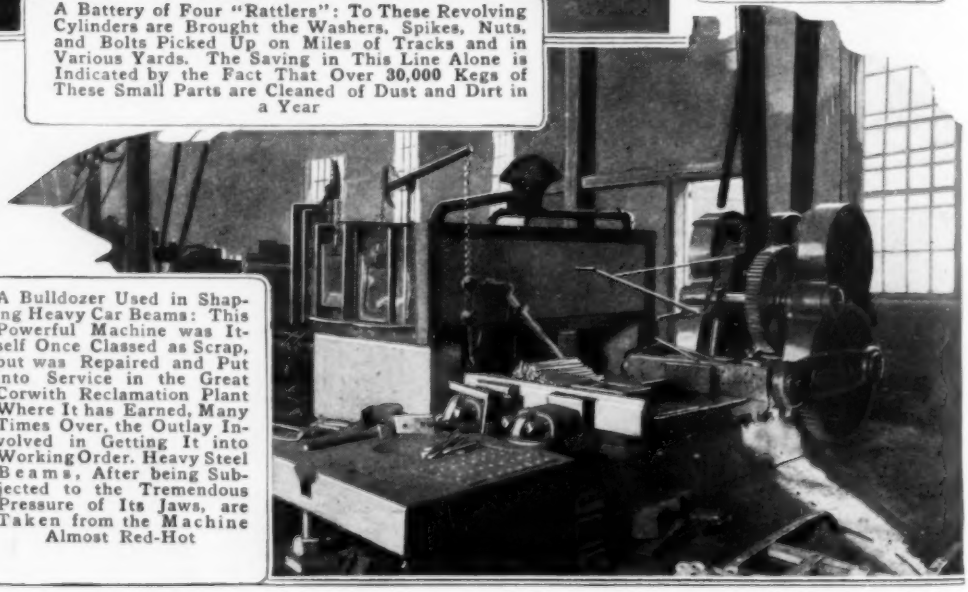
Nut-Tapping Machine in the Santa Fe Plant Which Was Once Part of the Scrap Pile: After Reclaimed Nuts are Taken from the "Rattlers," Shown in the Picture Below, They are Rethreaded in Larger Sizes in These Machines and Are as Good as New Nuts, Though Their Cost Is Very Low

Above: Reclaiming Old Bolts in the Shops of the Chicago, Milwaukee and St. Paul Railroad. Approximately $2,000 Worth of Bolts are Saved by This Machine in the Course of a Year



A Battery of Four "Rattlers": To These Revolving Cylinders are Brought the Washers, Spikes, Nuts, and Bolts Picked Up on Miles of Tracks and in Various Yards. The Saving in This Line Alone is Indicated by the Fact That Over 30,000 Kegs of These Small Parts are Cleaned of Dust and Dirt in a Year

A Room in the Hose House: This Little Department of the Reclaiming Plant Saves the Santa Fe Railroad More Than $50,000 per Year. Instead of Selling the Scrap Hose with Nipples, Couplings, and Valves Attached, the Fittings are Removed and Many of Them Remounted. The Hose, Minus the Fittings, Sells for Several Times What It does with Them



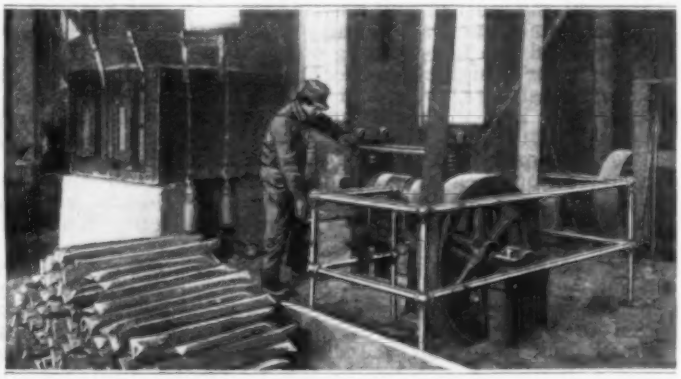
A Bulldozer Used in Shaping Heavy Car Beams: This Powerful Machine was Itself Once Classed as Scrap, but was Repaired and Put into Service in the Great Corwith Reclamation Plant Where It has Earned, Many Times Over, the Outlay Involved in Getting It into Working Order. Heavy Steel Beams, After being Subjected to the Tremendous Pressure of Its Jaws, are Taken from the Machine Almost Red-Hot

scrap is allowed to proceed to Corwith. The usable material found is put back into stock and reissued. The scrap is sorted into over 200 piles by experienced sorters. There are in Scrapville, for instance, rows upon rows of neat piles of scrap waiting their turn to enter one of the reclaiming plants: the tool house, the blacksmith shop, the forge, the hose house or the rolling mill.

At the very entrance of the yards, for example, we find a score or more huge boilers, while next to them are ranged perhaps a hundred great steel-car frames. Farther in, we come across two piles of couplers, one of which must contain nearly a thousand of them. These, we are told, must go to the blacksmith shop to be straightened or repaired in some minor respect, while those at the other end need additional parts. The small pile close by represents the couplers that will later be passed on by an expert, to decide whether it will pay to weld and repair them, or whether they will be scrapped. There are a half dozen great stacks of angle bars, about 30 cords of them, I should say, of different sizes, shapes, and conditions. Some of them need straightening, some repunching, and others just polishing up a bit. Still others are fit only for the furnace and the rolling mills. Just across the aisle is a pile of different-sized nuts, which are being sorted according to their sizes by four old men. If they weighed like coal I'd say there were perhaps 20 tons of them. And the aisle itself is interesting. It is paved with long slabs of one-time boiler plate, as is practically every runway and platform of the entire yards.

Across from the couplers we see tiers of heavy brake beams, and next to them, piles of bridge steel and structural iron—and thus it runs through the materials into the tools, and then on to the equipment and furnishings, finally ending in a mass of tangled tin and sheet iron. A giant mass this is, and one that offers no hope of salvage; that is—to the layman. But this is made up mostly of car roofing—the material from which the cans, buckets, oilers, etc., are made. Coming out of the tin shop it is worth more than ten times what it would bring as scrap, and at surprisingly low cost of reclamation. This roofing has another use. Every building in Scrapville is built of scrap material, and galvanized-iron roofing has entered largely into the construction of them all. The tin shop, the forge shop, and the hose house are made almost entirely of this material.

An endless stream of truckers were hauling the scrap into the various buildings: the blacksmith shop, the hose house, the tool house, the mill, the brass house, the machine workshop, etc. An interesting old fellow was bringing a wheelbarrow load of heavy springs from the spring yard. This yard contained some 12 or 15 cars of springs that were sorted into perhaps a dozen piles. The springs themselves ranged in size from those bigger than a wastebasket to ones that you would find it difficult to slip over your finger. Most of them, however, were about the size of a man's head.



Old Boiler Flues are No Longer Sold as Scrap Iron, but, on being Removed from the Boilers, are Put through This Machine, Which Flattens Them So That Washers and Other Parts can be Cut from Them

I followed the wheelbarrow of springs into the blacksmith shop where they were dumped into a large bin. From this bin they were slid into a roaring blast furnace, and, after a minute or two, jerked out with a pair of long-handled forks and placed on a heavy anvil. A wedge was driven between the coils of the white-hot spring, a steel measure held gingerly by its side to determine its proper height, and then the spring was dipped into a large vat of tempering oil. It was allowed to cool and then put into the spring-testing machine, where a big pneumatic plunger forced the coils together a half dozen times, and then the spring was tested as to its strength and resiliency, to determine whether or not it had been properly retempered.

Most of the springs were found satisfactory and were thrown into the outgoing bin. Those that did not temper back properly were gripped at one end by a strong chain while the plunger of a powerful pneumatic cylinder was clamped to the other end. Next a valve was thrown open, and, with a deep, swishing sigh, the spring was pulled out into one long piece of steel. Then the straightened steel rod, which was once a coil spring, was passed on to the machine shops to be made into nail pullers and other useful tools. This little process has proven decidedly profitable, as over $500 worth of nail pullers were made here in 1917, to say nothing of the dozens of other kinds of tools. Besides that, almost $2,000 was saved by retempering old

springs, after the cost of material, labor, shop expense, and supervision had been deducted.

Beyond the spring-testing and pulling machines spreads the blacksmith shop with its heavy equipment, practically every piece of which was once scrap. First, there is the steam hammer, a gigantic automatic sledge that will straighten with a few blows the most unruly mass of twisted structural steel, car frames, and the like.

Next stand two fast-working power hammers, used for straightening steel rods, light iron and steel bars, tools, and for welding. These, too, are composed mostly of reclaimed material.

The bulldozer and the I-beam bender are noted for their tremendous strength. Two heavy-steel car beams were placed in this bulldozer, and its powerful jaws bent them into the desired shape under such terrific pressure that they came out almost red-hot.

Although every shop in Corwith has a dozen or so wonders in the way of reclaimed junk to exhibit, the display to be found in the forge shop is a model of cleverness in utilization. The forges themselves are the lower sections of old worn-out engine smokestacks, the grates for which have been rescued from old scrap fire boxes and remodeled for use in the blacksmith shop. The back shields of the forges are made from old boiler plate, while old railroaders will recognize in the various other parts and equipment all sorts of odds and ends that once did service on the right of way.

The tin shop comes next. It specializes in sheet-iron car roofing, and in his report to the United States railroad administration its originator says: "In our tin shop we employ 25 experienced tinsmiths, men and women, who manufacture all of our buckets, oilcans, smokejacks, etc., from scrap galvanized car roofing, which formerly was sold at less than it cost us to load it on cars. The buckets, cans, etc., made from this galvanized iron, being of very heavy gauge, are much superior to the class of tinware usually sold by commercial houses. During 1917, we made 53,344 pieces at a total net saving of $7,046 over what new tinware would have cost."

Not bad for a tin shop made of scrap tin and utilizing scrap material that was sold for less as junk than it cost to load, especially in view of the appeal that the railroad administration has just made that all galvanized iron and tin be reclaimed at any cost on account of extreme and growing shortage of raw material.

The scrap galvanized iron and tin that comes in is first trimmed, and all unserviceable material bundled as scrap. The serviceable material is then cut into specific sizes, after having been rolled perfectly flat and smooth. Then it is cut into the desired shapes and put into rolling, pressing, and clamping machines, after which handles of sheet iron, galvanized wire, or steel, are attached. Following this the product is painted and put into stock. Among other things, 14 different sizes of oilcans are made in the tin shop, besides five kinds of water buckets, six sizes of paint buckets, four different-size dippers, to say nothing of innumerable signs, funnels, measures, drinking cups, and miscellaneous special tinware.

Next comes the air-brake room, where all the parts and equipment of the air brakes are reclaimed and tested. This room is equipped with one standard test rack, one angle cock grinder, and one small lathe, all reclaimed. By repairing and reclaiming air-brake parts and valves this shop saves the road $15,000 a year, above all operating expenses.

Adjoining the air-brake room is the hose house, which offers an interesting lesson in utilization and economy. This little plant saves the road considerably more than $50,000 a year. Only seven men are employed here and they mount all the air-brake, steam-heat, signal, and fire hose used on the entire system. The ordinary practice is to sell scrap hose to the junk dealers, with the nipples and couplings attached, the whole being sold on the basis of malleable iron, whereas, with the fittings removed, the hose will sell for ten times as much, as rubber. But that is not the only interesting feature. The most valuable part of this outfit is the fittings: the nipples, couplings, and valves. When they are reclaimed, and perhaps repaired a little, they are worth much more than the hose.

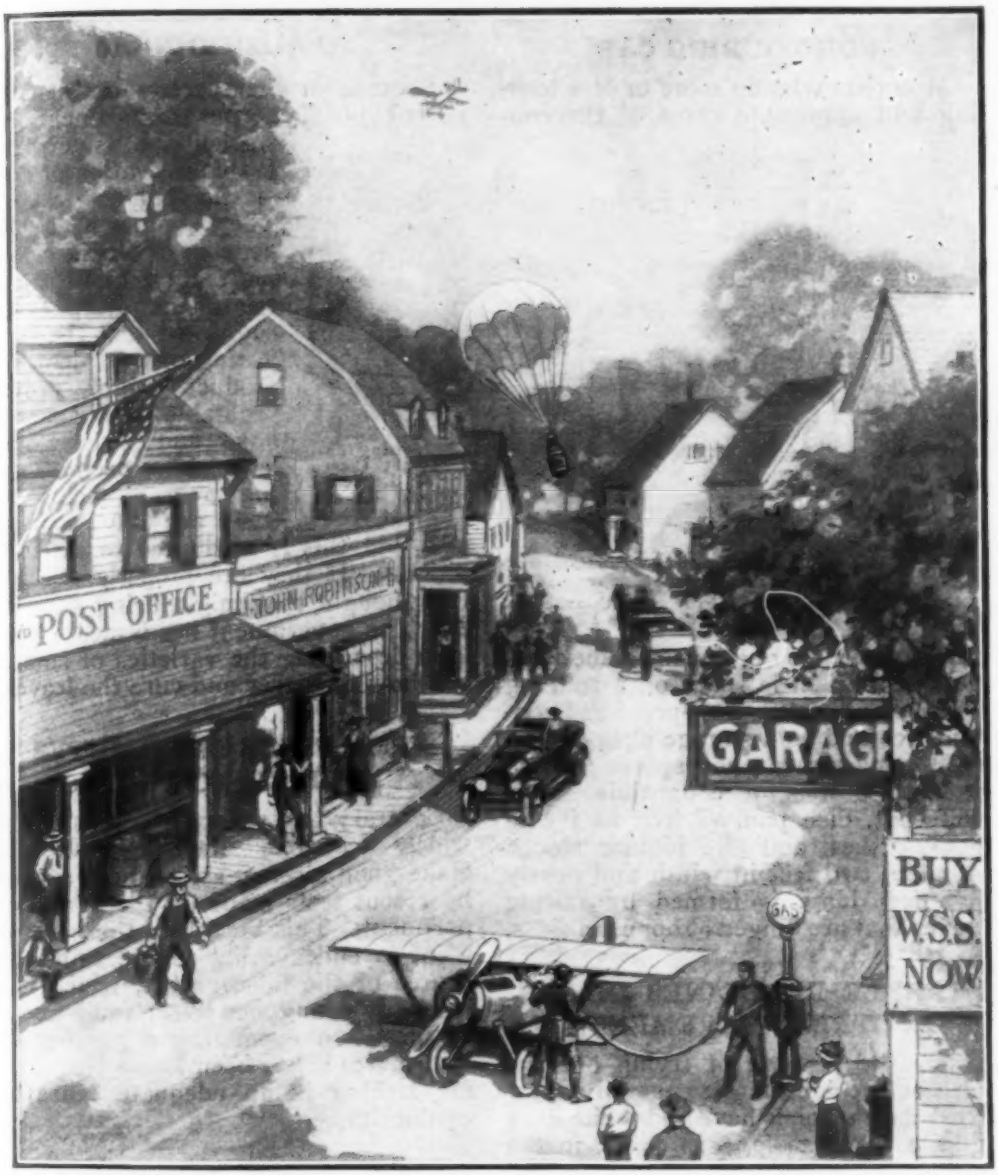
The hose-house crew at Corwith dismounts all scrap hose, repairs fittings where necessary, and then remounts them on new hose, which, when completed and tested, is sent out on the road at about one-fifth the cost of new hose and fittings. And in this connection they also keep close tab on the length of service given by the various hose purchased, and the refunds, due to inferior hose or short service, amount to $5,000 a year.

Near by is the pipe and fitting room, where three men reclaim and repair scrap pipe and fittings, such as elbows, couplings, tees, crosses, etc., and during 1917 this department netted a saving of $5,665. In the same shop are three men using two pipe threaders, and one pipe cutter making standard nipples from steel pipe which is of no other use. The yearly saving from this work is $2,500 and is being increased right along by adding workers and machines.

Pipe of all sizes comes in with the scrap, and that which can be reclaimed is cut into as long pieces as possible and then rethreaded. The short pieces left are threaded at both ends into nipples. A nipple-threading machine in use here, which was brought to Corwith as scrap, is capable of threading 3,500 nipples a day.

In the tool house thousands of small tools are monthly repaired, the rescued pieces from scrapped tools being used to salvage similar tools from the scrap pile.

AEROPLANES SMALLER THAN BIG BIRDS OF SEA



AEROPLANES of less wing spread than some of the largest albatross of the South Seas are being produced in England. The wings of these tiny machines extend only 15 feet, while albatross have been known to measure 17 and 18 feet from tip to tip. It is considered likely that air craft of this type will prove valuable to the aerial mail service after the war is won. Large machines will no doubt be used for long nonstop flights, but for maintaining interurban service the small, less expensive planes quite probably will be employed, at least in England, it is contended. The artist's drawing presented herewith is intended chiefly for comparative purposes. It shows one of the small aeroplanes taking on fuel in a village street, while a mail-bearing parachute floats earthward from a large "through express" flying aloft. One is struck by the thought that a 15-foot aeroplane would occupy no more space in a village street than some farmer's hayrack, although in the interest of safety it is hoped that airmen will not get in the habit of alighting in such places.

COMPACT "KITCHEN CABINET" FOR TOURING CAR

Motorists who do more or less touring will appreciate some of the convenient features of a lunch cabinet that occupies but little space on a running board of a car. It is dust-proof and contains ice and cold-storage chambers, a food compartment, and spaces for two vacuum bottles, a collapsible stove, coffeepot, dish pan, as well as frying pans, dishes, and five folding stools. A table, two feet in width and nearly five feet long, is formed by raising leaves that are hinged at opposite sides.

The Sides Raised to Form a Table Large Enough for Five or Six Persons: Space is Provided within the Box for All of the Utensils and Accessories Illustrated

Showing the Cabinet Closed and Locked, Ready for the Running Board

MARBLE DEADLINES INLAID IN STREET PAVEMENTS

For the purpose of trying out the idea before adopting it generally, New York City officials have laid white lines of tile and marble, 6 in. wide, in the pavement at certain street intersections to serve as deadlines for vehicles. Considerable trouble in connection with the control of traffic by the police has been experienced in trying to get motorists to stop at an imaginary line. With a broad, white marking set in the pavement, there can be no mistake as to where cars should stop. Both tile and marble have been used in making the trial marks, to ascertain which is the more durable.

SUMAC LEAVES NEEDED TO AID TANNERS

Because of the scarcity of the imported product, the Department of Agriculture is urging the conservation of domestic sumac leaves. They contain 25 to 30 per cent of tannin, making them very valuable to tanners. It has been suggested that the collecting of this plentiful product might prove profitable for many boys and girls. The leaves have been bringing only 80 cents to $1.10 per 100 lb., it is said, but this is attributed to careless picking. If they are properly selected it is thought they might bring $2.50 to $4. The government has issued a bulletin describing the varieties of sumac and how to gather and cure the leaves.

ARMY FINDS DEAF-MUTES UNSUITED TO FLYING

Contrary to a report which has been widely scattered, deaf-mutes do not make good airmen, as has been shown by recent tests made by the War Department. This branch of the government is endeavoring to ascertain the source of the false report, which has led many young men to seek enlistment as fliers. In examining a number of deaf-mutes it has been found that they are lacking in an adequate sense of equilibrium.

EMPLOY GRAVITY DELIVERY IN PAVING STEEP SLOPE

The steepness of certain San Francisco streets was taken advantage of recently in devising an economical method of handling the mixed concrete used as a base in paving these thoroughfares. The concrete mixer, the sand, cement, etc., were placed at the top of the hill near the section of the sloping street that was to be improved.

Concrete Mixer at the Top of the Hill, and the Upper End of the Chute into Which It Discharges

Section of the Steep Roadway being Paved with Material Which is Mixed near the Top of the Hill and Delivered through a Long Chute

Lower End of the Chute from Which the Wet Concrete was Delivered to the Paving Workers

and a long chute was extended down to the lowest level at which paving was to be laid. The mixed material was delivered by gravity through this trough, and as fast as the work progressed up the hill the chute was shortened, until the mixer was reached. This plan eliminated carrying wet concrete in wheelbarrows and made it unnecessary to move the mixer.

CURED SUGAR-CANE TOPS MAKE EXCELLENT HAY

Hundreds of thousands of tons of sugar-cane tops that formerly went to waste are now being cured to produce an excellent grade of fodder, or hay, on the estates of a large sugar-refining company both in Hawaii and on the Pacific coast. Before the cane is hauled to the roller mills for extracting the juice, the tops are removed and piled in windrows for drying. The cured product is later stacked and baled. In quality it is similar to timothy hay, and is said to be even more nourishing than clover and alfalfa.

BRACKET HOLDS RECEIVER IN OPERATING POSITION

Free use of both hands while telephoning is made possible by a wire device, lately invented, that holds the receiver in convenient operating position. The bracket is so constructed that it normally depresses the receiver hook. To release the latter, a thumb piece is pressed. The hook is drawn down and the bracket member moved in the opposite direction, when one ceases telephoning. The device is convenient for both home and office use, and especially in public-telephone booths.

At the Left Is a Close View of the Receiver-Holding Bracket, Which is Shown in Use at the Right

MILK CAR REFRIGERATED BY BRINE COILS

Maintaining the temperature of a refrigerator milk car by means of brine pipes has been tried out with success

Interior of Milk Car Used on an Electric Line, Which is Cooled by Brine Coils: The Latter are Filled from the Milk-Depot Brine Tanks While the Car is being Loaded

on an electric line serving a large middle-western city. The brine coils are located next to the ceiling of the car, and while it is being loaded, they are connected with the brine tanks in the milk-depot refrigeration plant. The car is readily cooled by this method and remains at a low temperature long enough to be drawn a much greater distance than the milk is hauled at the present time. The Department of Agriculture supervised the tests made with this equipment. It is thought that the general adoption of the method described would result in greatly extending the milk-supply radius of large cities.

CARELESSNESS IS CAUSE OF UNTIDY STREETS

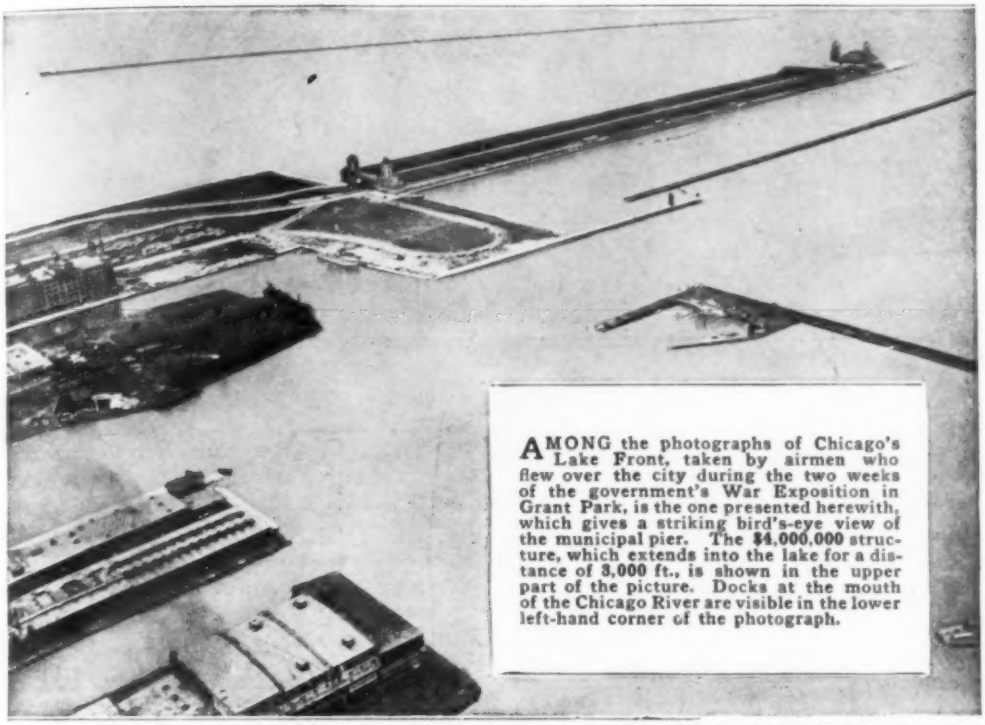
While Americans as a whole cannot be classed as untidy in their homes and offices, on public thoroughfares and in public conveyances they certainly practice most untidy habits. This has been repeatedly borne out by facts gathered by the Anti-Litter Bureau of New York's Merchants' Association. That bureau is now engaged in a campaign, particularly in congested East Side districts in New York, to prevent the scattering of papers and refuse in the streets. The cost entailed in cleaning up the matter which the public carelessly throws onto the sidewalks or into the gutters, when said refuse might have been put in trash containers, is enormous.

A report recently issued by this bureau states that in the last six years more than 8,000 summonses were issued in New York City for violations of laws relating to street cleanliness. Push-carts, from which fragments of paper or rubbish often fall, are a principal cause of untidiness. School children are also serious offenders, their common habit being to scatter paper, brought from the schoolroom, in the near-by streets. Cigarette smokers are cited for their thoughtlessness in throwing away empty cigarette packages. Newspaper readers are also contributors to the general unsightliness by discarding part or all of their papers.

SAFE GARAGE HEATER BURNS OIL

A new type of heater for garages, which burns kerosene or gasoline, is in reality a miniature warm-air furnace, provided with special means for making it safe to operate in a room where gasoline is used. The safety feature is similar to that of a miner's safety lamp, all the air for combustion being taken in through a fine gauze through which a flame will not pass. It is said that gasoline can be poured over and around the heater without danger. The burner is wickless and does not give off soot. All the heat is discharged at the top so that the heater can be placed close to a car without injuring it.

CHICAGO'S MUNICIPAL PIER AS SEEN FROM THE AIR



AMONG the photographs of Chicago's Lake Front, taken by airmen who flew over the city during the two weeks of the government's War Exposition in Grant Park, is the one presented herewith, which gives a striking bird's-eye view of the municipal pier. The $4,000,000 structure, which extends into the lake for a distance of 3,000 ft., is shown in the upper part of the picture. Docks at the mouth of the Chicago River are visible in the lower left-hand corner of the photograph.

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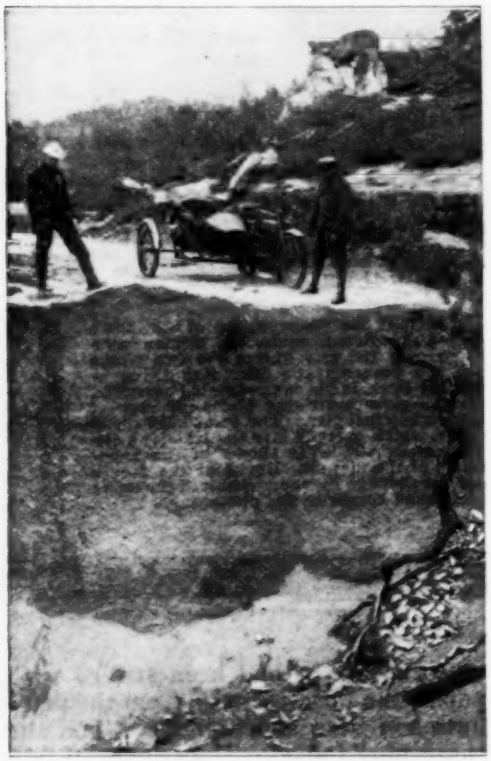
REPAIR RACE NEW CONTEST FOR MOTORCYCLISTS

One of the western motorcycle clubs recently staged a "trouble-shooting" contest that proved to be as interesting as it was novel. While the riders were blindfolded and stationed at a starting line a few yards from their machines, the latter were fouled in various ways. The race consisted in getting the engines started. At the crack of a pistol, the entries pulled off their blindfolds and ran to their motorcycles in a wild scramble to get the motors started. The winner of the event spent only 3 min. 40 sec. in locating the trouble and remedying it. The carburetor had been stuffed with paper, the terminal wire from the magneto had been short-circuited, and the spark plug fouled. The winner of second place spent six minutes in getting his machine under way, and the third to finish consumed eight minutes. The other contestants failed to finish.

At the Height of the Mechanical Scramble: Half a Dozen Motorcycle Enthusiasts Endeavoring to Locate and Remedy Engine Trouble in a Timed Contest

TELEPHONE SAVES HUNTERS PERILED IN MOUNTAINS

The recent experience of two sportsmen in the West illustrates what a menace washouts sometimes are to per-



Hunters at Edge of One of Two Washouts Which Effectively Marooned Them High in the Mountains for Three Days, Until Forest Rangers, Summoned by Telephone, Came to Their Rescue

sons roaming the mountains, and what a blessing the forest rangers' telephone lines are in times of peril. At an elevation of 9,600 ft., the men were caught in a violent thunderstorm and soon after found the trail made impassable by a torrent filling an arroyo, 100 ft. wide. Traveling in the opposite direction five miles, they came to a second washout which completely blocked their escape. Their plight might have been serious but for the rangers' telephone line which was still intact. On calling a ranger, a party was sent out to repair the trail, and after three days' "imprisonment" the two men were able to resume their journey.

ARMY WANTS CAMERA MEN TO TAKE WAR SCENES

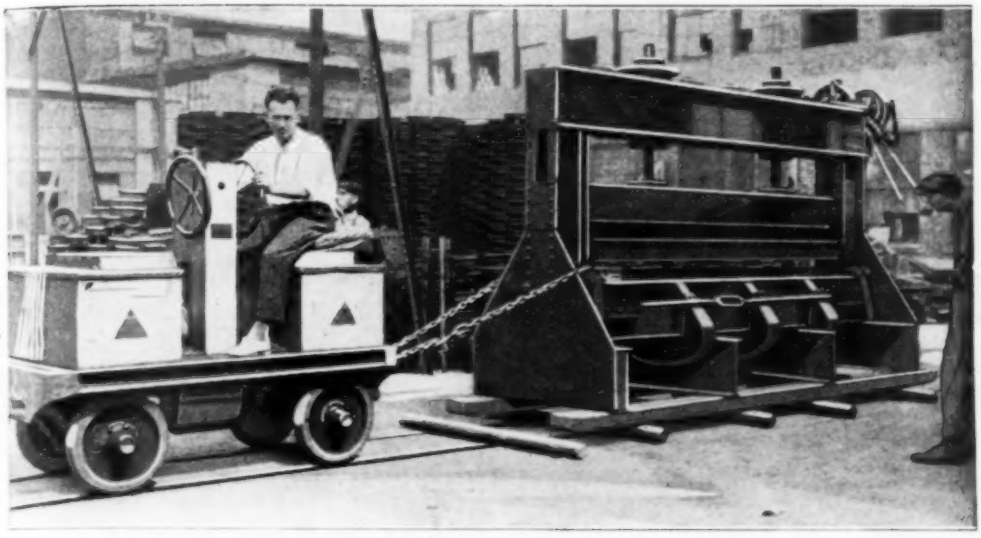
A large number of men who have had experience in taking photographs for news purposes are wanted by the Signal Corps to aid in making a pictorial history of the war. About 60 more lieutenants and as many sergeants, first class, are to be selected for this work. In addition, the War Department will give commissions to a limited number of men in civil life. In selecting these camera men, much will depend on their previous experience, the purpose of the War Department being to obtain photographers who know the news value of pictures. Some of the men chosen will be sent to the School of Photography at Columbia University, New York City, to learn the types of pictures wanted. Full particulars can be obtained by addressing the Office of the Chief Signal Officer, Photographic Section, Arcade Building, Washington, D. C.

STAKES INDICATE LENGTH OF GOLFERS' DRIVES

The golfer who prides himself on his skill in driving the ball, no longer need depend on guesswork or his imagination in determining the length of his drives while playing on a certain nine-hole course in the Middle West. Alongside the fairways, between tees and holes, plainly visible stakes have

The Stakes alongside the Fairway on This Golf Course are Placed 50 Yards Apart and Enable the Player to Estimate the Length of His Drives

been placed every 50 yd. These enable the player quickly and closely to estimate the distance which his ball travels.



With Dispatch and Ease the Little Tractor Does Work That Would Demand the Services of Many Men if Attempted Manually. The Rails Visible in the Picture are Not Laid for the Use of the Tractor

SMALL INDUSTRIAL TRACTOR DOES HEAVY WORK

Many valuable uses are continually being found for the industrial tractors that are now widely used in factories and warehouses throughout the country. Tedious tasks of moving heavy machinery, for instance, that once required the services of many men armed with crowbars and rollers, now is most frequently accomplished by small, sturdy tractors, with dispatch and ease.

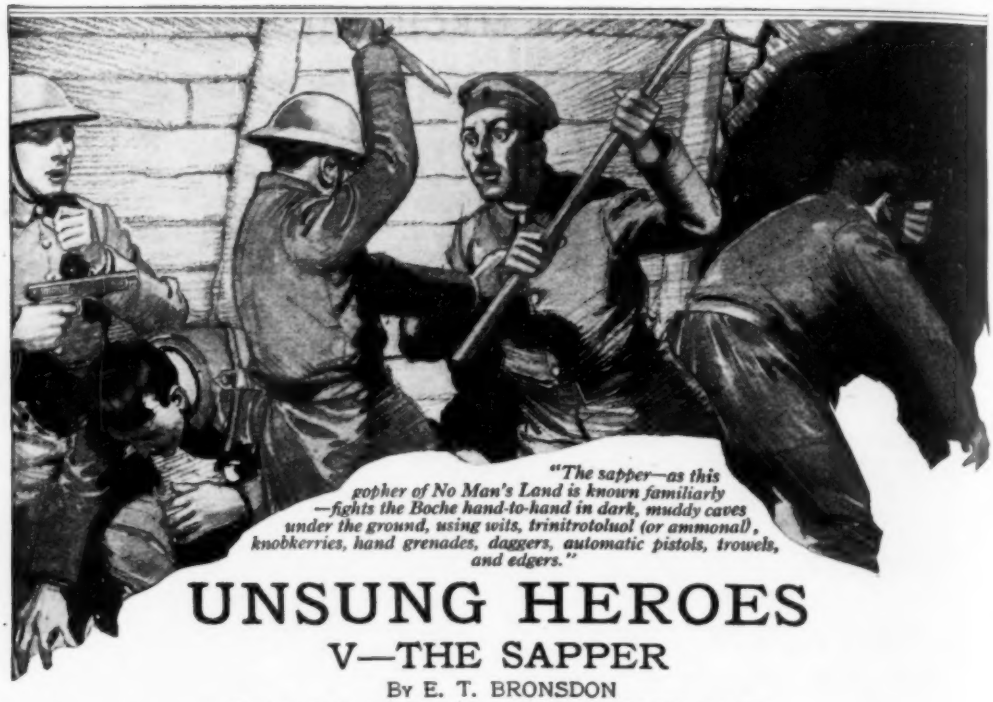
YEAR'S EXPORT OF FILMS WOULD ENCIRCLE WORLD

Enough motion-picture films to reach around the world, with plenty to spare—approximately 30,000 miles of the ribbonlike photographic strips—were exported from the United States in the fiscal year ended last June. This country is now the world's largest producer of films for cameras and projecting machines. The value of the motion-picture exports for the past year was nearly $7,000,000, an increase over 1915 and 1916, but not so large as 1917. The decrease was undoubtedly occasioned by the war.

HUGE MEGAPHONE AIDS CAMP BUGLER

With the aid of a huge megaphone, installed at the top of a slope in one of the training camps, a single bugler is able to make his calls heard over the entire area. The conical sound magnifier is about eight feet long and is pivoted to the top of a post set in the ground. The bugler places his instrument in the small end of the megaphone, and as he plays, slowly swings the latter through a wide arc. In the remotest sections of the camp the notes can be heard.

A Bugler, with the Aid of a Huge Megaphone, Making His Calls Heard in the Remotest Sections of a Training Camp



"The sapper—as this gopher of No Man's Land is known familiarly —fights the Boche hand-to-hand in dark, muddy caves under the ground, using wits, trinitrotoluol (or ammonal), knobkerries, hand grenades, daggers, automatic pistols, trowels, and edgers."

UNSUNG HEROES

V—THE SAPPER

By E. T. BRONSDON

The text of this article has been passed by the Chief Military Censor.

ROMANCE has deserted the level battle ground. The artillery officer will tell you that war is a mere matter of camouflaging positions and then firing according to mathematical formulas and data furnished by the "sausages"—observation balloons. The cavalryman—who vanished practically as a heroic figure after Balaklava—will vouch that war is sordid. It makes him leave his horse behind in the same cavern of oblivion which acts as storehouse for the bows and arrows of the famous London Archers, and become an ordinary "doughboy." The latter willingly goes on record, saying that war is a horrible mixture of mud, murder, and "maconochie"—the latter being the canned ration of fat, meat, and vegetables which is a staple in the trenches of all the allied armies.

Above the ground and under the ground, however, the grimness of mathematical certainty has not reached. The airman still matches personal skill, shrewdness, and daring against the same qualities in his rival, and because of this very personal element in the conflict, romance and a certain degree of chivalry still trail the smoking exhausts of the battleplanes. The flier, because of the "high visibility" of his exploits, has every observer for a press agent, while his equally adventurous brother below the ground never breaks into print unless either he himself or his German enemy tells of his accomplishments.

The sapper—as this gopher of No Man's Land is known familiarly—fights the Boche hand-to-hand in dark, muddy caves under the ground, using wits, trinitrotoluol (or ammonal), knobkerries, hand grenades, daggers, automatic pistols, trowels, and edgers—the latter two being the tools with which most "saps" are excavated—in a continuous campaign in which a few hours' napping at any time means almost certain destruction. His is the double duty of blowing up the enemy and seeing to it that the enemy doesn't retaliate or do it first.

The usual quota of sappers for a battalion on duty in the first-line trenches is half a platoon. This body is officered by engineers and commanded by a first lieutenant. The personnel usually includes an unusual number of N. C. O.'s and second lieutenants because of the technical knowledge required for some of the work, but rarely is an officer of higher rank than first lieutenant engaged in it. Equally rarely does a man climb to higher commission out of the ranks of the sappers. If he is good, he is too valuable underground. The man may win military decorations, but if he does it will be for some *coup de maître* that would make an infantry major a lieutenant colonel. On the occasion of the exploding of the "Half-Mile Mine," which signaled the opening of the first British drive in one important sector, the lieutenant who supervised the whole of the extensive operation under the German lines was rewarded with the Victoria Cross—but he remained a lieutenant and a sapper.

Immediately upon consolidating a new line of trenches the corps of sappers takes charge. Theirs is the work of planning the necessary dugouts for the battalion. The sappers are not required to dig these, except under unavoidable circumstances such as exist at the time when a powerful series of

counter-attacks is being launched against the new position.

The sapper's ordinary work commences at the farthest wall of one of the subparapet dugouts. Here he drives out a horizontal tunnel or sap from 10 to 15 yards, and from 10 to 12 feet below the level of the terrain. This is a broad communicating sap through which much earth must be carried. On an ordinary battalion front in the fire trench there are from three to five of these communicating saps.

The communicating tunnels lead directly to the lateral sap (or saps, as in several instances two or more have been used). The lateral sap is the "subcellar fire trench," the main defense of the whole trench system against underground attack, and at the same time the line from which all allied sapping attacks start. It is usually a reinforced tunnel, five or six feet in height, four or five feet in width, and extending the length of the battalion front. When two are used, the second is situated 10 yards or so farther into No Man's Land, and placed so that its roof is three feet or less below the floor of the first lateral sap.

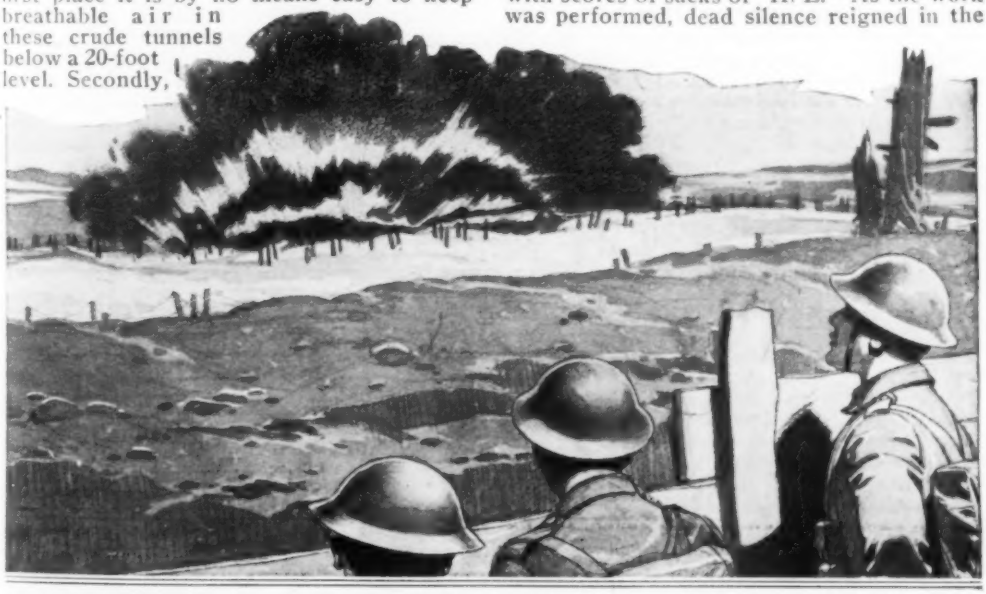
Considered as a defense system, these saps may be understood easily. They are out there underground for the express purpose of keeping Fritz from tunneling under the allied defenses. Two lateral saps almost definitely preclude this possibility, since they present a subterranean front at least 23 feet in depth. Fritz cannot tunnel over the higher sap because uneven pits in the ground surely would bring him to the surface and detection. He has difficulty driving a sap under the lower, for in the first place it is by no means easy to keep breathable air in these crude tunnels below a 20-foot level. Secondly, all along the two lines of allied lateral trenches microphones are listening incessantly for the faint "pick! pick!" which unmistakably heralds the approach of an enemy sap. Provided the microphones are in order, and a sufficient quantity of explosive is on hand—which never is lacking—it is obviously next to impossible for the Germans to accomplish anything other than their own destruction by driving a tunnel into the line of laterals.

Since the Germans invented this system, one would expect that they would retain "an ace in the hole" in the shape of a method of circumventing the lateral-sap system. Such actually proved to be the case in a short sector of line early in 1917.

For a full week allied sappers had been frantic. All along the line the noises of an advancing German sap had been heard. At first it was supposed that the Boches were ignorant of the existence of the allied lateral, and preparations were made to give the visitors a hot reception.

As the hours went by, however, the "pick! pick!" came but little nearer in volume of sound, though undoubtedly progressing—somewhere! Explorative saps were driven out, to determine a solution of the menacing mystery. Finally, by recording the guesses of 20 microphone listeners, it was decided that a German sap was passing directly under the allied lateral at a depth of approximately 35 feet!

Throwing discretion to the winds, the allied sappers then sunk a half dozen perpendicular shafts to a depth of 25 feet, and as near to the Boche sap as they could guess. The bottom of these shafts was filled with scores of sacks of "H. E." As the work was performed, dead silence reigned in the



"They had not long to wait! Six hours after the shafts were started they were detonated, and a terrific explosion rent the earth immediately in front of the allied fire trench. Forty yards of the allied lateral was completely destroyed, but with it 12 German sappers were killed, and the curious, broad, low-level tunnel they were building completely destroyed."

German sap. The intruders, not absolutely certain of discovery, just were waiting for a sign which would tell them surely whether to proceed with the intricate mining operation they had planned, or simply to quit and blow in the heads of the new allied saps that sounded so strangely near.

They had not long to wait! Six hours after the shafts were started they were detonated, and a terrific explosion rent the earth immediately in front of the allied fire trench. Forty yards of the allied lateral was completely destroyed, but with it 12 German sappers were killed, and the curious, broad, low-level tunnel they were building completely destroyed.

Anxious to discover the method by which these enemies had been working, the allied sappers dug down and recovered the bodies. They found them buried in the remains of a lateral gallery which they had started just back of the allied fire trench above, with the evident intention of extending the ramifications to include a certain small salient on which two previous German attacks had failed.

The workers all wore oxygen tanks and masks, similar to those given firemen in this country when fighting a fierce blaze. This was the explanation of their ability to live and work at the 35-foot level. They were not troubled by the bad air, since each man carried his own supply.

Since this happening, the allies have invented means of their own for circumventing the laterals of the Boches. It is not advisable to attempt to describe these at the present time.

The system of laterals is the starting point for all forward saps. These are various in kind and purpose. Besides the normal attacking tunnel, which has for its object the planting of a mine under some otherwise invulnerable point in the enemy's line, there is the barbed-wire sap. This is a thin ribbon of an excavation affording room only for a line of workers flat on their stomachs. As the tunnel proceeds, the dirt is passed back in a chain of small buckets, and the empty buckets come back on the other side.

The barbed-wire sap, as its name implies, proceeds just far enough below the level of the ground to escape detection. It is aimed to pass directly below the two lines of Boche barbed wire. If the enemy has a good system of laterals outside the entanglements, this attempt invariably ends in disaster for the workers in the tunnel, who are helpless. This is by no means always the case, though, and quite often in the past the allies have succeeded in burrowing underneath the whole scheme of German wire, mining the tunnel completely, and then, when an attack was to be launched, blowing a broad swath through the wire.

This method is popular wherever it is possible, since it takes Fritz entirely by surprise. Its advantage over the usual custom of shelling the wire, and thus creating an opening for attack, is that in the latter instance the Germans are not in the least deceived. They have time to place machine guns for a terrific enfilade through the newly made gates, whereas, when the blowing of a barbed-wire sap is the only prelude, they cannot do this.

Besides these two saps, the main uses of tunnels are to reach advantageous positions for listening posts or hiding places for snipers. Particularly in established positions these are used. The listening post, a shell hole somewhere out near the Boche wire, is selected, and a narrow tunnel driven out so that it comes out to the surface on the far wall of the crater. This position then is occupied each night by two listeners—until it is located by an enemy patrol. That particular evening the two listeners usually do not return, and the sap is caved in to prevent its use by German spies.

A sniping sap is simple. It differs only from the foregoing in having as its object a clump of bushes, or some ridge of uneven ground from which vantage point the sniper can see the German parapet without being seen.

The popular idea of the grubbing life of the sapper is far from the truth. He gets soon to love his work as no other fighter loves his, with the possible exception of the airman. An example of the possibilities in the way of excitement—as well as the sacrifice of self that is made uncomplainingly by these men—occurred at ———. A private in the French army was the hero.

The battalion to which he was attached had been advancing its system of trenches gradually for weeks. This had been done without driving the Boches from an inch of the territory they were holding. In the beginning the French fire trench had been 300 yards from the German parapet. When the gradual advance ceased the two were only 60 yards apart.

After putting down laterals in front of the new position, the French tunnelers sent forward explorative saps. It was not known at the time whether the German position was well defended or not.

The French private mentioned found out, and in a curious manner. Turning his edger —a tool somewhat like a large auger and bit, now often used in place of the pick for cramped quarters—he broke through suddenly into empty space. Hurriedly placing his eye to the crevice formed he saw that he had inadvertently broken into the German lateral.

Suddenly faint he fell back, momentarily expecting the explosion which would send him "pushing up the daisies." It did not come!

Two minutes later he summoned courage to peep again. No one was in sight, though several lights were burning. The truth dawned upon him. The Germans, feeling perfectly secure and not dreaming of an underground attack from the new French

"The private had two chances. One was to dive for the sap through which he had come, letting slip his opportunity to wreak havoc on the German lateral. The other was to destroy the sap utterly with the occupants who were coming—and himself."

position, were all at evening "stand-to" formation, and the lateral was deserted.

Hastily forcing an entrance, the private dragged out kegs of high explosive from the earthen cupboards along the walls. These he piled into a huge mound, and attached a wire from his cable. Then he was about to retire.

A muttering of German voices sounded in one of the communicating saps. The occupants were returning!

The private had two chances. One was to dive for the sap through which he had come, letting slip his opportunity to wreak havoc on the German lateral. The other was to destroy the sap utterly with the occupants who were coming—and himself.

Back in the allied fire trench the soldiers gasped with surprise and wonder when the earth opened before their eyes, hurling lumber, fragments of human bodies, and all the complicated accessories the Boche finds necessary to underground life, high into the air. It was not until a successful raid two weeks later that the true story was learned from the prisoners.

MACHINE-GUN NESTS CONTROLLED BY WIRELESS

REPRODUCED above is the artist's conception of a Danish inventor's new system of defense, in use. The plan consists of fortifying a line with a series of "automatic soldiers," which essentially are disappearing turrets equipped with machine guns. Radio control is provided. Operators, stationed far back of the line, control the firing the same as if gunners were stationed at each weapon. When not in action, the cupolas are flush with the ground and invisible to the enemy. By actuating switches, however, they are caused to rise 18 in., bringing the guns into firing position.

Mounted Forest Ranger with Pack Horse Loaded with Tanks in Which Are Small Fish to be Used in Stocking Remote Mountain Streams: Note the Breech Straps on the Animals to Hold the Loads from Slipping When the Horses Descend Steep Paths

PORTABLE SEARCHLIGHT HAS VARIED USES

To meet the special needs of the navy, as well as of municipal fire and police departments, railways, etc., a portable searchlight has been brought out which is unusually powerful for its size and is provided with several useful features. The six-watt lamp and reflector are mounted on a universal joint, above the case containing the batteries, and in the handle is a small switch for throwing the light off and on, while at the back of the projector is a knurled ring which can be turned, moving the bulb and bringing the rays into sharp focus. On the front of the battery case is a telegrapher's key by which the Morse code can be signaled. The lamp throws its rays 2,000 ft., or more, and its beam can be seen many miles, making it well suited for signaling at sea.

CARRY FISH ON HORSEBACK TO MOUNTAIN STREAMS

As an illustration of the pains taken by fish commissions in western states to stock remote mountain streams, the carrying of young fish by pack animals to points many miles from the highways, may be cited. In California, for example, the little fish are brought from the state hatchery by tank motor trucks to points well up in the mountains. There they are transferred to small tanks which can be strapped to pack horses, and are taken by forest rangers to streams, sometimes 30 miles distant. The rough nature of the country over which the fish are carried is indicated by the fact that both pack and saddle horses are provided with breech straps which prevent their loads from slipping over their heads when descending a steep trail

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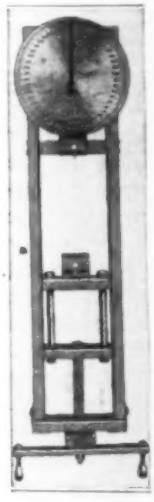
OIL AND GAS RATIONS NEXT UNLESS USERS ECONOMIZE

Comprehensive efforts are being made by the Bureau of Oil Conservation to enlist the coöperation of all gasoline and fuel-oil users in preventing avoidable waste so that war needs

may be met without forcing the enactment of drastic regulations. "Stop the Leaks and Save the Drops" is the slogan of the bureau, which is striving to prevent the necessity of resorting to oil rations. Motorists and truck owners are admonished to do everything in their power to increase their per-gallon mileage. Gasoline must not be used for cleaning purposes, nor engines run when machines are motionless. Carburetors should be adjusted to use the thinnest possible mixtures, and cut-off cocks installed in the feed lines to prevent gas consumption when cars are coasting. Measures must also be taken by everyone to prevent unnecessary evaporation of gasoline. No oil should be wasted. That drained from crankcases, differentials, and transmissions possesses commercial value. Even residuous oil, used in cleaning, can be reclaimed and must be saved. Those who handle and burn fuel oil are instructed to stop all leaks in pipe lines, fittings, valves, and storage tanks. The latter should be equipped with heating coils.

MACHINE TESTS STRENGTH OF BELTING

A simple, durable machine for accurately measuring the tensile strength and stretch of leather, rubber or canvas belting, or other substances, consists of a rectangular frame about 60 in. long, the sides of which are of channel iron and at one end of which is a 1,000-lb. spring dynamometer connected with a clamp movably mounted in the channels. One end of the material to be tested is fastened in this clamp and the other end is a second clamp, the movement of which is controlled by a screw, so that the substance in the clamps can be submitted to as much tension as desired.



ELECTRIC CRIME DETECTOR REPEATS PHONE TALKS

Telephone conversations very frequently are of much importance in criminal detection and prosecution. Quite a remarkable machine for recording such conversations has of late been added to the facilities of the state's attorney's office at Chicago. Instead of using records of the ordinary type, the instrument, when connected in a telephone circuit, records speech on a prepared wire that is reeled from one drum to another.

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This Machine, without Necessitating a Change of Records, will Record a 40-Minute Telephone Conversation

The particular advantage of this arrangement is that a conversation lasting even 30 or 40 minutes can be taken without changing records. Rendition before a jury of a conversation that is offered as evidence in a case, obviously has a more profound influence than the mere reading of a stenographic transcript of it.

BIG ENEMY-GUN PLATFORM CAPTURED IN ATTACK

It develops that the massive gun emplacement in Châtelet Woods, captured by Franco-American troops some weeks ago, was not the foundation of one of the "Big Berthas" which had been shelling Paris intermittently. Contrary to first reports, the revolving platform, about 33 feet in diameter and bearing the mark of the Krupp Company of Magdeburg, was intended for

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Revolving Platform of 15.2-Inch German Gun Found by Franco-American Troops after Capture of Châtelet Woods: The Emplacement was First Reported as That of a "Big Bertha" Which had been Shelling Paris

a 15.2-in. weapon of about 30-mile range which would have been able to bombard Meaux or Commiers. The enemy had approximately finished the installation when the Yankees and poilus made their victorious drive. Before beginning their hasty retreat, the Huns succeeded in removing the gun from its mountings and attempted to blow up the platform.

MOTOR-TRUCK TRAILER HAS IMPROVED FEATURES

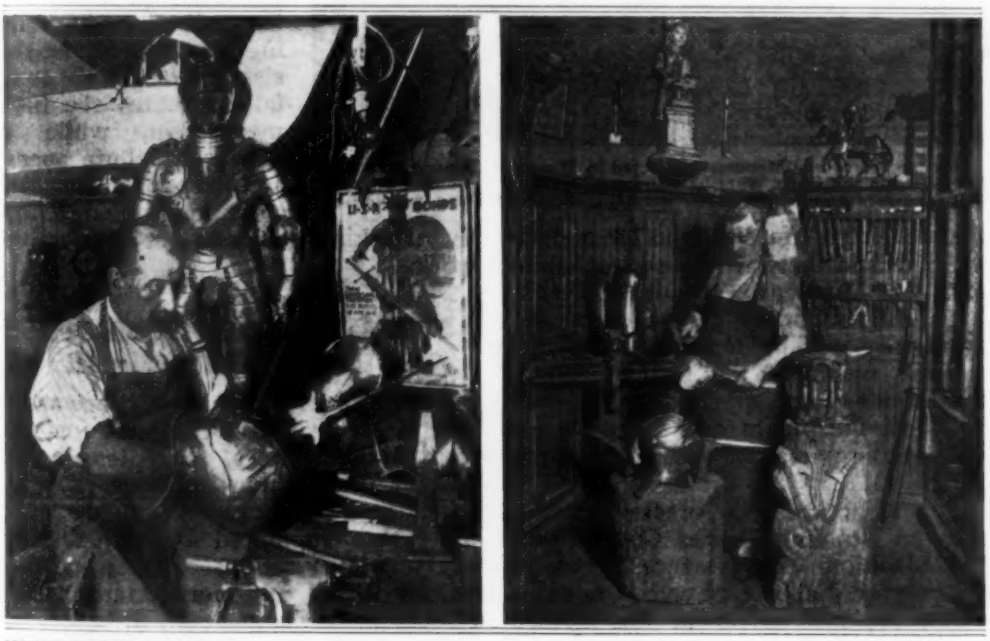
New Features in This Heavy Truck Trailer Are a Relief Spring on the Drawbar and the Swivel Bolster with Adjustable Dogs. The Trailer Has a Capacity of 11,000 Pounds, Equal to the Capacity of the Trucks for Which It is Designed

With the increasing demand for trailers as a means of adding to the capacity of trucks, have come various improvements in these units. One trailer of late design, having a capacity of 11,000 lb., is provided with a strong spring on the drawbar, relieving the latter of undue strains, as in starting. A swivel bolster is provided which automatically adjusts itself when a corner is turned. The dogs on the bolster can be set for any desired width. By means of a ball-and-socket hitching device the trailer can assume any relative position with respect to the truck.

FASHION ARMOR FOR TROOPS IN ANCIENT SHOP

Astonishing as it seems when visualized, there is considerable likelihood that our soldiers will be wearing heavy armor, similar to that of the knights of old, by the time they penetrate the Rhine country. Authority for this assertion is to be found in an official statement issued some days ago by the War Department. Further authority is the fact that several thousand suits of experimental armor have already been manufactured. Significant, to say the least, are the heavy breastplates now worn by the Germans, the light breastplates supplied to British troops, the armored waistcoats of the Italians, to say nothing of the steel helmets and trench shields long ago adopted by all the armies. For several months the armor workshop in the Metropolitan Museum of Art at New York, which dates to the fifteenth century and was brought to this country from France and reassembled, has been a busy place. There, surrounded by tools, anvils, and armor of the early centuries, a French armor maker, Daniel Tachaux, whose forbears for generations have clung to the dead trade of the armorer, is working under the supervision of the Ordnance Department. He is endeavoring to develop practical armor that will turn machine-gun bullets. Already 25 different types of experimental armor defenses for Yankee soldiers have been patterned. Of some styles a few score have been made, and of others many thousand have been manufactured in various plants. Even arm and leg guards are included in these defensive devices, all of which are adaptations of designs worked out in the days when knights wore suits of steel.

¶The universities of France have eagerly accepted the offer of 100 scholarships for French women in American institutions of learning, which was recently made on behalf of the association of American colleges.



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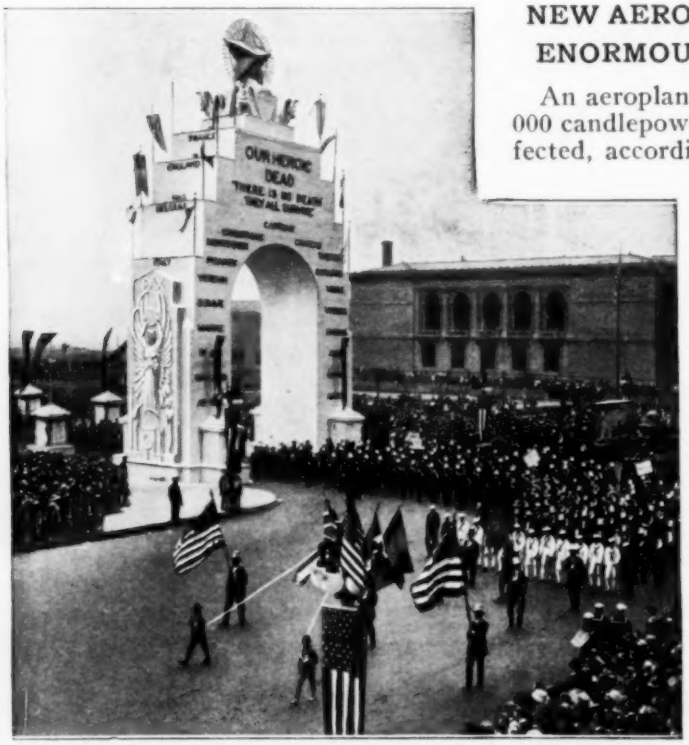
Left: Working at His Bench Repairing a Helmet of the Sixteenth Century, Daniel Tachaux, World-Renowned Armorer of the Metropolitan Museum of Art, Who has been Commissioned by the Government to Design Protective Armor for Our Soldiers in France. Right: Here Monsieur Tachaux Is in the Fifteenth-Century Workshop, Where French Knights in Olden Days had Their Fighting Togs of Steel Made to Measure. This Shop, Now in the Metropolitan Museum of Art, Formerly was Situated at Abbeville, France

GREAT ARCH A MEMORIAL TO CHICAGO HEROES

One of the most notable of the many memorials erected in this country to the men from America who have given their lives in the war is the great white arch on Michigan Avenue, Chicago. It is of temporary construction and eventually will be replaced by a permanent memorial of fitting design. Either side of one approach to the arch are kiosklike pillars on which are inscribed the names of the city's heroic dead.



Imposing Temporary Monument Erected in Honor of Chicago Men Who have Died in the Great War: The Great Star at the Top and the Names of Engagements in Which Americans have Shared are Done in Gold Leaf

The structure was erected by the Chicago Building Trades Council and its dedication was a feature of one of the greatest Labor Day celebrations in which the metropolis of the Middle West ever particpated. Surmounting the arch is a great gold star, while at the sides, above, are the names of our allies and below these are appropriate symbolical figures embossed in plaster. The main structure together with the pillars represents an expenditure of twelve thousand dollars.

NEW AEROPLANE FLARE HAS ENORMOUS CANDLEPOWER

An aeroplane flare of 300,000 to 400,000 candlepower has recently been perfected, according to an announcement by an officer in the Ordnance Department. The tremendous illuminating power of this new accessory for fighters in the air can be better appreciated when it is stated that it is equivalent to 150 to 175 street arc lamps and that, if suspended 1,500 to 2,000 ft. above the earth, it will light up a circular area one and one-half miles in diameter. The flier releases the flare by pulling a lever and the resistance of the air as it falls actuates the fuse mechanism, while a silken parachute opens and keeps it suspended aloft long enough for the attacking planes to get in effective work.

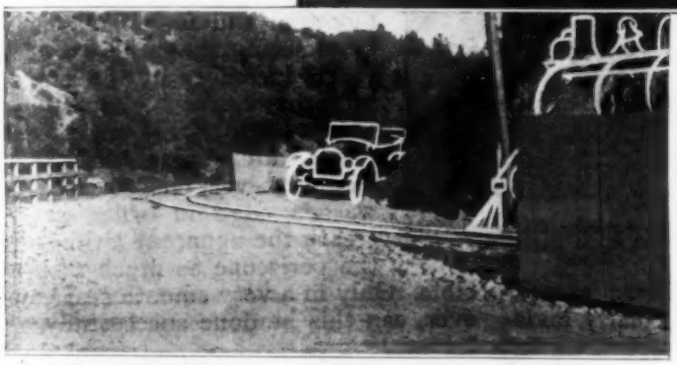
BRITAIN SEEKS DOMESTIC SOURCES OF FUEL OIL

Several interesting suggestions as to how Great Britain may obtain fuel oil from home sources, to replenish the present diminishing supply, are contained in a report recently made by a committee appointed by the British minister of munitions. These include drilling for oil, and more extensive development of the shale-oil resources in Scotland. Carbonizing cannel coal is another method proposed, the claim being made that 1¼ tons of fuel oil can be obtained from every 20 tons of coal.

HIGHWAY CROSSES RAILWAY ON "BLIND" CURVE

One of the most dangerous railway crossings with which western motorists have to contend, is that which occurs on one of the state roads in California leading to the Yosemite National Park. At the point where the railroad and highway make abrupt turns around the base of a steep-sided hill, they cross. The place is so highly conducive to disaster that all trains make a full stop before attempting to round the curve. Along the straightaway on either side of the crossing, where the motor road and the tracks parallel each other, a dividing fence has been erected to further safeguard against mishaps.

The Death Crossing, on a California State Road, Is Visible at the Extreme Left of the Picture Above



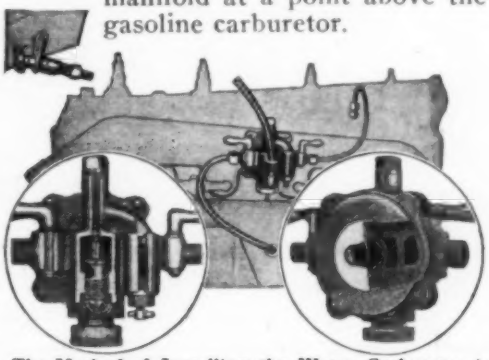
A Close View of the Curve, with Car and Engine Outlined to Show the Dangerous Character of the Crossing

AUSTRALIAN WATER TANKS MADE OF CLAY

Owing to the scarcity of galvanized iron in Australia, due to war conditions, the government officials in charge of water storage for the cattle ranches have been forced to utilize native clays in providing suitable reservoirs. At one point a 10,000-gal. tank of this material was constructed and proved quite satisfactory. The only cost was that of the labor and a few pieces of timber.

WATER CARBURETOR CLAIMED TO INCREASE MILEAGE

Among the new devices for conserving fuel and for the prevention and removal of carbon formations in automobile motors there is an interesting needle-valve water carburetor for which the usual claims of efficiency are made. The instrument is fastened to the exhaust manifold, from which it obtains considerable heat. It is connected at one end with the water jacket and is supplied with air through a tube that extends to an adjustable valve installed on the cowl. Water is aerated and vaporized in the carburetor and introduced in the intake manifold at a point above the gasoline carburetor.



The Method of Installing the Water Carburetor is Illustrated at the Top. The Inset at the Left Shows the Needle Valve, While That at the Right Gives an Interior View of the Instrument from the Back Side

WHY SUBMARINES ATTACK AT DAWN

Why the U-boat is most effective in the early morning, is explained very well by the accompanying photograph, taken near sunrise. Of course twilight makes any craft dim, but that aids the victim nearly as much as the submarine. With the best modern camouflage, even a large ship is nearly invisible against a dark-gray sky in the early hours of day.

While the Horizon Is Plainly Visible, the Inky Blackness of the Water in the Foreground Makes the Detection of a Periscope Most Difficult

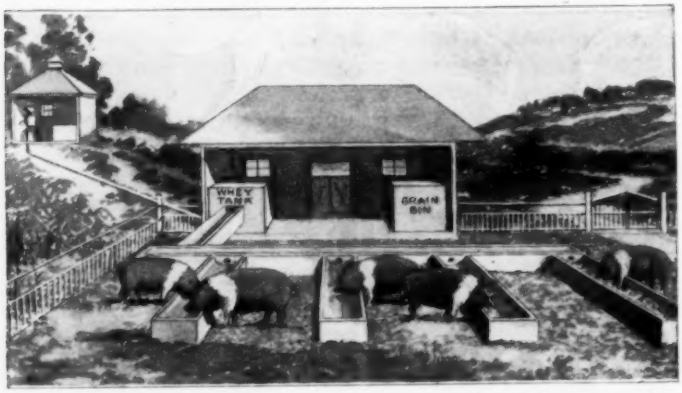
One fact is not generally appreciated. At daybreak in northern latitudes there is nearly always a fog or cloudbank on the horizon which is dispelled later either by the sun's heat or by the wind. This bank casts a heavy shadow up to within a short distance of the observer. Frequently the water shows inky black nearly alongside, or at best but a few hundred yards away.

Thus it is very easy for the low-lying submarine to creep up on the ship which, being more lofty, is outlined against the brighter sky above. The same principle holds true near moonrise, although the difficulty of seeing the large vessel is vastly increased by the lack of a bright sky for background.

One method of overcoming this disadvantage is to station lookouts very close to the water's edge in order to increase the apparent altitude of the periscope as much as possible. Only in a very smooth sea, however, can this be done successfully.

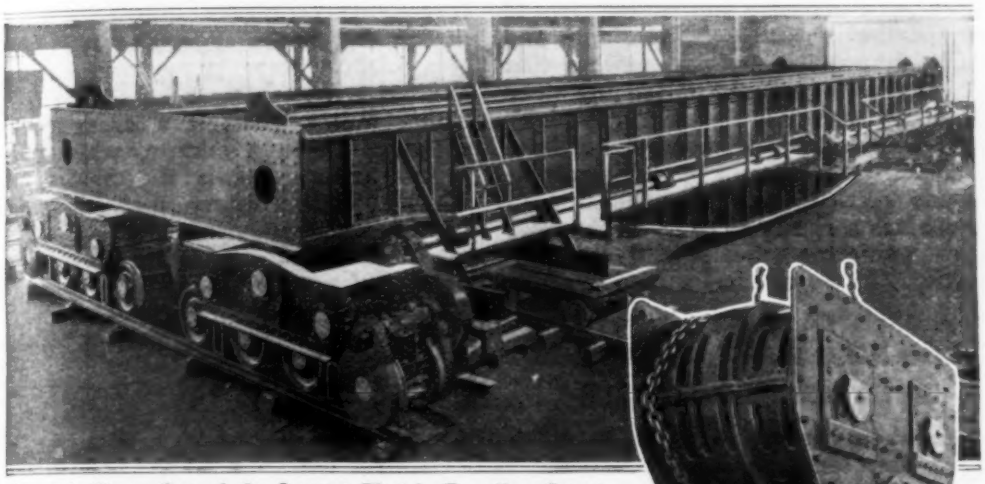
LABOR-SAVING SYSTEM FOR FEEDING HOGS

A particularly convenient arrangement of outbuildings on a medium-sized dairy farm effects a considerable saving of labor in feeding a drove of hogs whose pen is located at the foot of a slope. A small-farm cheese factory is located 80 yd. away on the hillside, 18 ft. above the pen. A large portion of the pigs' feed consists of whey obtained in making the cheese, and instead of carrying it down to the pen in barrels or pails, it is piped to a tank in a feed shed at the foot of the hill. Here it is mixed with grain and then allowed to flow into a large trough, from which it empties into lateral feed troughs in the pen, through three-inch holes.

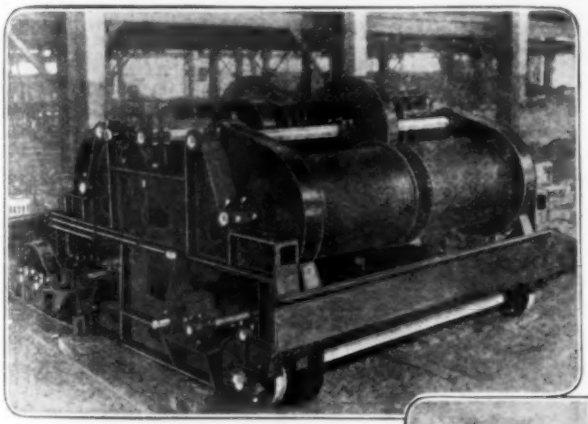


Feed Troughs for Hogs Supplied by Gravity with Whey and Grain from a Near-By Feed Tank, Which in Turn is Filled in the Same Manner with Whey from the Separator on the Hillside

BIG ELECTRIC CRANE BUILT WITH THREE HOISTS

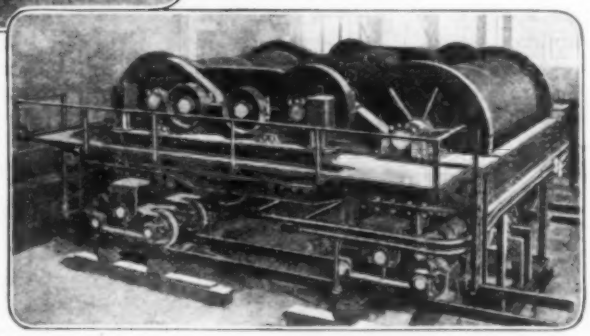


Above is Shown One of the Largest Electric Traveling Cranes That has been Built. The Main Hoist Has a Lifting Capacity of 300 Gross Tons, and the Auxiliary Hoists Handle 85 More



The Auxiliary Trolley Is of Special Design to Accommodate the Different Speeds of Its Hoists, Which Vary from Two to 45 Feet a Minute

The Main Hoist-Hook Block, Pictured Above, Measures 12 Feet from Top to Bottom. It is Constructed of Special Forgings and Weighs 37 Tons. Loads Amounting to 300 Gross Tons are Handled by It



The Main Trolley Has a Single Hoist with Two Drums and Two Lines of Gearing. This Overcomes the Possibility of a Swinging Motion being Imparted to the Load

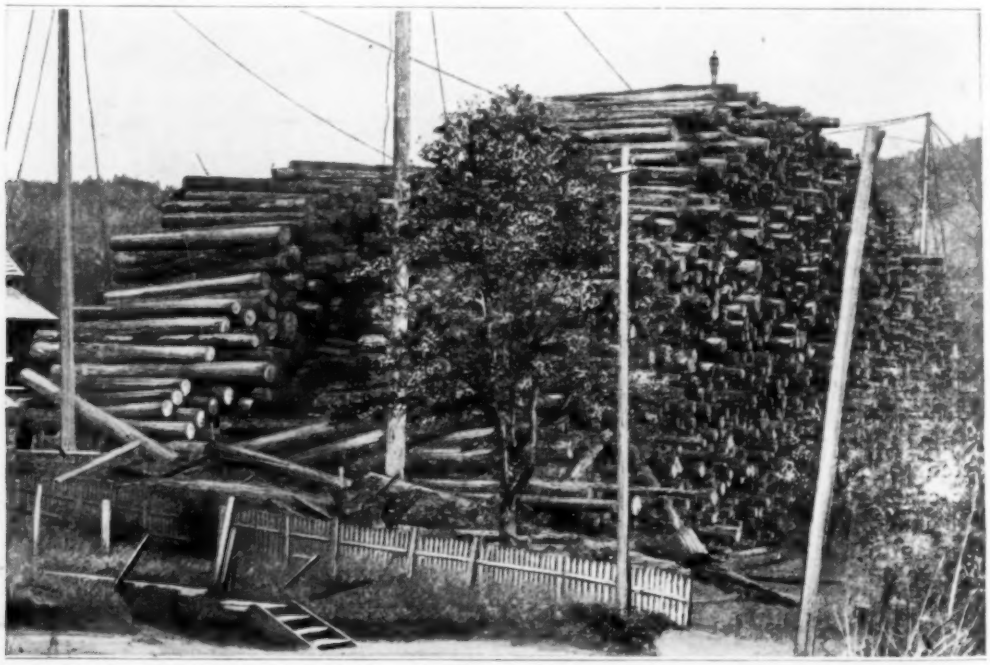
Sixteen freight cars were recently employed in transporting, from factory to place of installation, what is reputed to be the largest electric crane so far constructed. The machine, composed of a main and two auxiliary hoists, has a combined lifting power of 385 gross tons. It was specially designed to permit a wide variation of hoisting and lowering speeds, and is claimed to have remarkable accuracy of control. The operator, for instance, can lower the main hoist, which has a capacity of 300 gross tons, an eighth of an inch at

a time. To accomplish this, both dynamic and jackshaft braking are employed. The lifting and lowering speed of this hoist is 12½ ft. a minute and is made possible by two motors that develop an aggregate of 400 hp. The auxiliary trolley is designed especially to provide for speed variations of from 2 to 45 ft. a minute of the two separate hoists carried upon it. The first of these has a lifting capacity of 80 gross tons, while the other is of five-ton capacity. The crane has a span of 90 ft. 4 in., and works on a runway, 120 ft. above the ground level. This places it over two other cranes of similar design and 30-ton capacity. It is carried on 32 wheels, is 21 ft. in height, and has a maximum lift of 100 ft. An 80-hp. motor gives it a cross-travel speed of 45 ft. a minute, while two 50-hp. motors enable the bridge to move 50 ft. a minute. The auxiliary trolley, supplied with a 30-hp. motor, has a cross-travel speed of 40 ft. a minute.

LOG PILE MAKES HUGE JOB OF SAWING FOR WINTER

For sheer bigness as well as for value in dollars and cents, the woodpile shown herewith, photographed in western Oregon, has few rivals. It is composed of logs, all of which are 40 ft. or more in length and many of them 5 ft. in diameter. The pile measures 300 ft. long, 75 ft. high, and contains over 5,000,000 ft. of lumber, board measure. The logs are stored here for winter sawing, and the bulk of the lumber obtained will be used in government work. Since the picture was taken a third tier of logs, as large as each of the two shown, has been added, making a total of 7,500,000 feet.

A number of university and college girls in the East and middle West, desiring to relieve the shortage of labor caused by the war, hired out to large shoe manufacturers as operatives during the past summer.



A Woodpile, 300 Feet Long and 75 Feet High, Containing 5,000,000 Feet of Lumber, the Greater Part of Which will be Used in Government Work: By Way of Comparison, the Big Oak in the Foreground Is 62 Feet High

COMMENT AND REVIEW

When the Boys Come Home

WHEN the boys come home there will be rejoicings and fêtes and receptions. In city and village there will be bands and addresses and honors for those who have bravely and willingly done all, and more, than was required or could be expected of them. It is yet too early to arrange for those days, but it is none too soon to plan for the weeks and months and years that will follow. One of the changes which we can expect will be that our indoor and office life will no longer appeal to the thousands of young men who have been living in the open. They will demand the freedom of the out-of-door life, and the broader scope of individual action which goes with it. The independent life of the scientific farmer will appeal to them as never before, and for their own good and the good of the nation, this desire should be met in a comprehensive manner.

Secretary of the Interior Lane, with admirable foresight, has worked out a plan which is both practical and desirable.

At the close of the Civil War there were vast areas of the choicest land which had never felt a plow, that thousands of returning soldiers were allotted under the homestead law. That was over fifty years ago, when hundreds of our now well-known western cities and towns had not been thought of. While there remains some good unclaimed government lands in various states, its total is a mere garden compared to what was available then.

The problem of supplying productive land in both our warm and colder climates becomes one largely of reclamation. Take the swamp and overflowed lands of Florida and the Gulf States, and a few other states, of which there are some 60,000,000 acres of the richest soil. There are also the cut-over lands which still lie waste, and other now barren lands in the far West, rich as the valley of the Nile when water is poured upon it.

These three classes of land are all capable of enormous production, once they are reclaimed and tilled. This work of reclamation would immediately offer the inducements of outdoor activities, and when accomplished, a permanent home and occupation to thousands. Secretary Lane calls attention to the vastly improved terms of his plan over that of the early homestead days. Then the homesteader was also a pioneer, who started with almost nothing in the way of buildings, farm machinery, and stock. The nearest post office was often a day's journey distant; the life was hard and isolated. Progress was slow for want of money. The more abundant the crops, the less the price per bushel. There are still those living who remember the days when the expense of hauling a load of grain to the nearest market equaled every dollar the grain sold for. Papers and magazines were almost unknown; the settler's life was hard in the extreme, and in some places in actual jeopardy.

Under the proposed plan all this is to be reversed. The government would finance and engineer the reclamation; would build roads and farm buildings; would equip with necessary machinery and stock; would establish rural delivery. Where the pioneer did everything by the hardest work, scientific farming would reduce manual labor to a minimum; where he had to wait several years to move from his sod hut into something better, under the new plan the settler would commence with every essential to comfort and success. With these new districts fully settled as fast as developed, and with automobiles, the buyer of these reclaimed lands would be anything but isolated or remote. New towns will spring up to supply stores, and with so large a percentage of young people, conditions will be ideal. The above plan is an expansion of one already used with success in some other countries.

Nobody is to receive something for nothing. The government would use the returned soldier and pay him; as fast as one reclaimed section was completed and ready for occupancy, farms would be sold on easy-payment plans, the payments extended over a very long term of years if necessary. With their natural enterprise, the large portion of buyers would work out of debt in a few years.

While the actual work of reclamation would not be undertaken during the war, the details of the plan should be, so that, immediately on return to civilian life, those who desired to go into the reclamation work could do so. To accomplish this Secretary Lane is asking Congress for a few hundreds of thousands of dollars. Seldom has a more deserving appropriation been requested.

TO buy and hold Liberty bonds is just as much a patriotic duty for those of us here behind the lines as it is a patriotic duty for our soldiers to take and hold an enemy trench. There are occasions, though, when it is good military strategy to give up a trench, temporarily, when the cost of holding it far outweighs the results of doing so. In the case of the soldier his officer must determine the decision; in that of the individual Liberty bondholder, he must judge for himself. It is conceivable that circumstances will arise in occasional instances, where severe illness comes into a family and makes an unusual and unexpected drain on the monthly income, where the sale of a bond or two cannot be avoided, but that is quite a different matter from using one's bonds to purchase things that may be desirable, but not absolutely necessary to the family welfare. Even where money must be raised quickly it were much better to borrow on the bonds than to sell them at a discount, for this war will end one of these days, and when it does Liberty bonds will go above par.

Hold Your Liberty Bonds

Whatever you do, don't be talked into exchanging your Liberty bonds for fraudulent or questionable bonds or stock in some get-rich-quick scheme. At the present time enormous frauds are being perpetrated upon an unsuspecting and inexperienced public. It is estimated that at least $200,000,000 of worthless securities have been exchanged for Liberty bonds, during the past 12 months. Some financiers place the figure very much higher. Before we went into the war, the total number of bondholders in this country was estimated at 350,000. Today there are not less than 17,000,000 bondholders, of whom 98 per cent never before owned a bond of any kind. Their inexperience thus makes them an easy prey for unscrupulous salesmen, who, unable to sell their bad stocks and bonds for cash, hold out glittering offers through an exchange. By offering the Liberty bonds thus obtained at a discount, they quickly convert them into cash.

Therefore, unless one is experienced—even then it will do no harm—before trading good Liberty bonds for any other security, go to any responsible banker who will gladly and without any charge or obligation tell you the truth regarding what you are being offered.

DURING a recent trip to the Pacific coast, I met a locomotive engineer in Montana who was not only unusually skilled in his work, but who evidently was well read and a man who did his own thinking. In the course of our conversation the I. W. W.'s were mentioned, so he was asked to express his views on the subject. His reply is well worth repeating, and applying to all of us. He said:

Why Are I. W. W. and Such?

"You and I are responsible for I. W. W. Yes, you and I, and pretty much everybody. The trouble is we are either thoughtless in our replies, or lack the backbone to say what we really think. For instance, along comes some fellow who puts out a lot of bunk, but he does it in such a confident way you would almost think it was train dispatcher's orders. Perhaps we don't at all agree with his views, but we move along lines of least resistance, and rather than incur a more or less unpleasant discussion, or run the risk of making ourselves unpopular, we either pretend to agree with him, or make some noncommittal reply. In either case he has strengthened his cause in his own mind, and we have weakened our mental stamina by not standing up for what we knew to be right. Especially is this true where one nervy propagandist addresses several persons, or a crowd. Then each one in the crowd feels that perhaps he is the only one present with a different idea, and dislikes to pose as the odd one. And anyway, the majority must be right, and he, only one, may be wrong. It is easy to establish this condition when the speaker has a forceful and convincing style, and, while actually misstating facts, tells them in such a positive manner the audience even accepts the falsehoods without question.

"And that's the point; we don't question his proof, and so it goes undisputed. It's very much like a jury trial where one lawyer makes all sorts of claims, and the other side meekly lets them go unchallenged. There may be ample evidence to the contrary, but what good does that do if it is not used? It's like a locomotive in perfect condition, dead in her stall in a roundhouse—absolutely useless so far as moving freight is concerned; but fired up, and out on the main line with a mile of cars behind, then something's doing. No, sir! We should not agree

with statements we don't know to be facts, and we should buck up and stand our ground for what we do believe to be true. It's not always convenient to do this, but we would all be a heap better off if we did."

HAD it occurred to you, the universal loyalty of our colored citizens? Have you ever met a colored man in this country who was a pro-German? Do you even know anyone who thinks he has actually seen one? I have personally made this inquiry in the South, in New England, on the Pacific coast, and here at home in the central West, and have arrived at the firm conviction "There ain't no such animal" as a pro-German American colored man.

Our Colored Troops

When the big war started and Bernstoff let loose his long and carefully prepared plans of arson, bombs, strikes, and general confusion in this country, one of the most dastardly schemes on which his boss depended, was an uprising of the nine million colored people in the South. The effort was well organized, bountifully supplied with money, was operated with great secrecy, and at first was carried on outside the larger southern cities. All sorts of impossible rewards were promised; the blacks were to own and rule the South; every sort of poison lie was used to tempt the colored people into a revolt against the whites. It was expected and hoped this revolution would keep this country busy for the duration of the war. Of all this people in the North heard very little.

To the everlasting credit of the colored people they refused to be led into the trap, and like the proposed revolution in India and Egypt and some other countries, the plot miserably failed.

At last we entered the war. What then of the colored man? When voluntary enlistment was offered, he responded promptly and in large numbers. During the Civil War, it was no infrequent part of a northern general's report of a battle that "the colored troops fought bravely." The reports which are reaching us of the colored troops in France include more than "fought bravely"—they fight magnificently.

A letter from an officer describing such a regiment going "over the top" is a picture worth painting. Bareheaded, shirts unbuttoned or no shirts at all, with the most unearthly yells, as demons let loose, they went at the enemy like a cage of wild lions released. These boys from the cotton and cane fields like best to fight with the bayonet, which Fritz enjoys least of all, but in hand-to-hand combat they fall back on their trusty razor or knife, in the use of which they are more than proficient. The stanchest Hun is said to quail and run before one of these dusky giants bent on carving a map of Florida on a fat German face, or a delta of the Mississippi on his throat.

Yes, the colored troops are still "fighting bravely."

SOLOMON says "A good name is rather to be chosen than great riches," to which we may well add, "and a bad name is a liability, net."

The good work of removing German names of places is going on with increasing fervor. Individuals even who had no choice in the German name they bear are going into court daily and coming out with good American names. From all parts of the country comes the news of German having been banished as a public-school study. In fourteen states it has been eliminated entirely. The German-name propaganda, which has flourished for years, is being rudely swept away. There is still opportunity for further reform. Many towns and cities bear names distinctly German, and the loyal citizens of these places should lose no time in changing to something better. Not long ago a California city of 5,000 inhabitants changed its name and found the process not hard to accomplish, and the new name a great improvement. There's a bad spot though on the map, namely Bismarck, N. D. This town started out in 1872 with the good name of Edwinton. Then German propaganda got in its work, and on the promise of German money (which never came) its name was changed to Bismarck. When the cornerstone of the capitol building was laid the German ambassador was present, and Bismarck himself wrote the town a letter commending the "intelligence of its citizens." That letter, still in the archives, would make a good occasion for a public meeting and a patriotic bonfire.

Change German Names

However, streets, avenues, public schools, parks, hotels, places, buildings, clubs, banks, and insurance companies galore are being rid of the German names cleverly put upon them, and given names which do not suggest Hunism. We can't all fight Huns with a gun, but we can all fight the results of their poisonous propaganda which is in evidence every day, and if any of us fail to do so, we ought to go before an examining board and find out what is the matter with our moral spine. Let us clean house, disinfect, expurgate, and get at least every visible trace of the Hun poison out of our social system.

Reconstruction of the Disabled

ALREADY the stream is trickling back to our shores of the wounded and disabled, which must soon increase to a vast river. The thousands upon thousands of hospital beds in France will soon begin the graduation of their patients. Some will go back to the trenches, many will be sufficiently recovered to return home. And with their arrival begins the work of reconstruction, which is to make a man feel he is still a man though deprived of leg, or arm, or sight. In the enthusiastic first flush of hero welcome we are apt to spend ourselves in sentimental sympathy, or as Lord Charnwood aptly puts it, "The more we drown the disabled in tea and lip gratitude the more we unsteel his soul, and the harder we make it for him to win through in years to come, when the wells of our tea and gratitude have dried up." Our efforts must be along the lines of restoring him to a full place in the ranks of working life.

In all previous wars the permanently disabled soldier was cheerfully accepted as out of the running, and either left to shift for himself or given a pension and practically forgotten. In the new order of many things, the reconstruction of the disabled is one of the best, and in this our allies have done, and are doing, a wonderful work. Our own government has its plans well formulated.

Men with only one arm or leg, or none, will be supplemented with artificial limbs and taught to do useful work, which a few years ago was deemed quite impossible. Results along these lines have proved wonderfully surprising. It is for all of us, then, as we greet the returning patients of the surgical ward, depressed and discouraged for the moment over the condition of their homecoming, to welcome them with such determined assurances of what they will still do and be despite their handicap, that a dark prospect of life may be changed to high hopes. It is in the first few weeks that the crippled soldier will most need our encouragement. Let us each see that none but words of hope are uttered; make him feel our conviction that he still has a life of real usefulness and accomplishment before him.

Surprises of the War

AS these lines must necessarily be written several weeks before they reach our readers, any reference to what is being accomplished "over there" would have become history, so rapid is the progress of events. We knew our boys would make good, but we had no right to expect that after two generations of peace our forces could, in the incredibly short time allotted for preparation, graduate into the efficient organization they have already become. That our men in action have earned the generous and unqualified approval of those veterans of our allies who are so thoroughly qualified to judge, affords us honest pride. Not the least surprising of what our forces have been able to accomplish has been the spirit in which our officers and men have taken up their work. Instead of the boasting or offensive self-confidence, which was looked for, our allies found an army terribly in earnest, to whom nothing seemed impossible, but who frankly said, "You know, now teach us how." The traditions of a century, received from a certain type of tourist, were shattered almost in a day, and we have come to be judged by what we really are, instead of by the erroneous conception of what we were. Personal contact reveals the real qualities; even the Hun is revising his confidence in what a "nation of bluffers" cannot do.

As the days go by, we of many nations are coming to a more just understanding of each other, just as a man remarked to me the other day: "I can never again speak of a 'Dago'; hereafter they will all be Italians." The mixing of tongues at the Tower of Babel was as nothing to the mixing of races now going

on in France, with this important difference: that where then only confusion resulted, out of this cosmopolitan, kaleidoscopic mingling there is being welded a unity of interest, and discovery of noble purposes at heart, such as the idealist in his wildest flights of fancy never hoped to dream. Common danger and adversity sweep away all barriers.

Gasless Sundays

IN a single night the mackerel annually leave the Newfoundland fishing banks; millions yesterday, today not one. You have seen the air filled with birds one day, and the following morning their noisy chatter had turned to silence, for they had flown. Just such a sudden and complete change was worked in the entire United States east of the Mississippi River on Sunday, September 1. On the main arteries of auto travel leading out of all our large cities, where several thousand machines were accustomed to pass every hour of Sunday, from early morning to midnight, not a car was seen. A strange, almost oppressive hush prevailed, like that in a beautiful garden the morning after the first hard frost.

Twenty million people, with 4,000,000 automobiles, gladly, cheerfully gave up their usual outing on one of the finest days in the year. To millions it was the one day in the week when the family could make a trip into the country together.

And all this not from any mandate—there was even no penalty attached—simply an appeal. The Army and the Navy were calling for more gasoline and the big reserves must be maintained. Everyone knew the reason; each was anxious to do his bit.

It was a magnificent demonstration of our nation-wide patriotism, and in its way a tribute to the spirit which our boys have carried "over there."

On the basis of two gallons saved by each motor vehicle—and this is probably conservative—the saving amounts to nearly 8,000,000 gallons; six such Sundays will represent one month's supply for our own and our allies' armies.

Maximum Effort a Joy

BY the time these words are read only a few days will remain in which to share in the fourth Liberty loan. Doubtless every one who reads these words has already signed up for at least one bond, but have you actually, honestly taken all you possibly can? Can't you take some more, or at least one more? There are always some very conservative people who say to themselves: "If the subscription runs short I can take some more at the close." But is this the right spirit? Would you want our boys to fight the Huns that way? To fight just as little as possible and barely win? Of course not; you want them to smash the Huns so hard they will be either killed or caught. Give them more and plenty, and then some. Of all times, now they are on the run is just the time to put on every ounce of pressure and finish up the job and have it over. For it's got to be done, and the sooner the better. That a shorter war costs fewer dollars isn't the important thing; it's that a shorter war means every day a saving in lives and limbs of our boys. We all, every one of us, want a share in this work, and those who can't go must do work behind the lines. And what can we do that will give us more real satisfaction than to overbuy the fourth loan? In what other way can we as well celebrate our recent successes?

If your next-door neighbor's house were burning, you would forget all about the time he threw something over your fence, and would be actually mad if some other neighbor wanted you to stand by and let him do all the work and receive all the glory. You would insist on helping, even if you didn't do more than rescue the canary bird. But you would not be content with that; you would go in again and again until there was nothing more to save. And you would want to do it; you would experience a genuine disappointment if you could not. It's the same way with these bonds—it's a joy, not a job, to buy them, and if we give up something else to do it, the satisfaction is just that much greater. There's no especial virtue or pride in doing the easy and inconsequential thing; it's the hard things which make for self-respect.

Yours for the Fourth Liberty Loan.

H. H. WINDSOR

September 20.

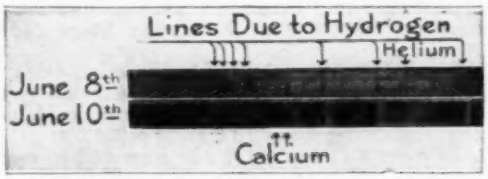
THE "NEW" STAR

Catastrophe of Centuries Ago Visible to Mankind Recently

By EDWIN B. FROST

Director of Yerkes Observatory

ON June 8, the day on which the solar eclipse was visible in the United States, a brilliant star flashed out in the evening sky in the constellation Aquila, at a point about 15° west of Altair and 40° south of Vega. It was seen at once by many persons familiar with the constellations, first in Europe, where the earlier advent of darkness gave the observers six or more hours of advantage. Examination of photographs now shows that the star had been recorded on many plates taken in the last 30 years, but always as a faint star fluctuating around the tenth or eleventh magnitude. A plate, fortunately taken at Harvard Observatory on June 7, tells us that the star had then risen to the sixth magnitude, so that it might have been just visible to the naked eye. The brightness increased a hundredfold during the day of June 8, and again fivefold on the following day, so that on the evening of June 9 it was the brightest star visible in the northern heavens, decidedly brighter than Vega, but closely resembling it in spectrum. No "new" star of such brilliance has appeared for over three centuries.



The spectrum contains innumerable shades, ranging through red, orange, yellow, green, blue, violet, in order of the frequency of their vibration. If any ray is absent, the spectrum shows a dark space or "line" at the corresponding point. The cut shows the spectrum of Nova Aquilæ with its dark hydrogen lines on June 8, and the double, dark and bright lines on June 10, 1918.

Since June 9, the star's color has changed from white to yellowish-red, and its brightness has diminished rather rapidly, with one or two slight revivals, until on July 8 it was of magnitude 3.6, or less than one-fortieth as bright as on June 9.

When we realize that this star is a sun, probably much larger than our own, we can see that tremendous amounts of energy must have been developed within a few hours; for we know that the star's brightness increased fully 50,000 times within a few days, perhaps in 48 hours, prior to June 8.

It was possible to photograph the star's spectrum with the apparatus at the eclipse camp in Wyoming, of the Yerkes Observatory, on the nights of June 8, 9, and 10, and thus to establish the fact that the expected change in the spectrum, from that of a white star to that characteristic of a "nova" (with very broad and brilliant bright lines fringed by the previously present dark lines on the side toward violet), took place during the daytime of June 10. This change implies an enormous flooding of the star's atmosphere with glowing hydrogen (chiefly); but since this occurred some hours after the period of greatest brilliance, it would not seem to be responsible for the increase in light.

A satisfactory explanation of the phenomena exhibited by such a star cannot be offered, partly because similar conditions of temperature, and perhaps of pressure, cannot yet be produced in a laboratory. The temperature of the star was probably not less than 20,000° F., or four or more times greater than can be developed experimentally at present. It would seem that an enormous explosion took place within the star, premonitory symptoms of which may have been the fluctuations occurring for years past.

Since photographic dry plates have been used in astronomy, some 25 stars of this kind have been observed, most of them faint, except Nova Persei, which flashed out on Feb. 22, 1901, and reached the first magnitude.

The behavior as found with the spectroscope is quite similar for these stars, so that we can predict with some probability that the star will fade out of sight, with irregular fluctuations, later to revive somewhat and display a spectrum very much like that of a nebula.

After declining to the seventh magnitude, Nova Persei of 1901 developed outlying nebulous appendages which moved outward at an extraordinarily high speed, so that it was the view of some astronomers that the apparent motion was only the progressive illumination of previously invisible matter as the light of the star reached it. By them the whole phenomenon is assumed to be the result of the entrance of a faint star, moving rapidly, into a previously invisible nebula, with the development of a vast amount of heat and light. The spectroscopic and photographic observations cannot be satisfactorily explained on this hypothesis, however, and it seems more reasonable to think that the unknown internal causes of the varying brightness of many stars (including our own sun to the extent of a few per cent) may be enormously exaggerated in the case of a nova. If we had any laboratory evidence of conditions tending to release the great stores of energy existing within the atoms and molecules of matter, we should look to them for the cause of this mighty outburst.

It should perhaps be added that the distance of this star is so great that several centuries must have been required by the waves of light to bring us the message of the catastrophe, traveling, as they do, at the rate of 11,000,000 miles per minute.

GRAIN SHOCKER DISPLACES HARVEST HANDS

Above, the Grain Shocker, Attached to a Binder, is Shown Filled with Bundles over Which the Compressor Arm is Swung. The Shock is Tied with Twine near the Top, and the Butts are Spread Apart so That They will Stand Firmly

The Grain Shocker Immediately after Discharging a Shock, Which can be Seen with a Widespreading Base a Short Distance to the Rear: A Long Swinging Arm is Delivering a Bundle, with Grain Heads Downward, to the Machine, to Be the Beginning of a New Shock

After extensive tests, a grain shocker has been placed on the market which has been pronounced one of the most important inventions for the farmer since the appearance of the binder. It attaches to a binder and operates automatically, performing the work of two harvest hands. At a time when grain raising is so important and farm laborers are so scarce, this machine is considered doubly valuable.

The shocker is mounted on two wheels and derives its power from the binder, from which it receives the bundles, holding them in a horizontal position until enough have collected to make a shock. On being tied together in a well-compressed shock, the bundles are discharged with the butts downward and spread apart enough to prevent their falling over. About one-third more twine is used than when shocking by hand.

The shocks are not capped, but are so put together that they shed water readily and are well ventilated. The grain is so carefully handled that few kernels are shaken off. It is said that less than one horsepower is required to operate the machine.

If the grain is long, the shocker and binder are raised to maintain the normal length of the bundles. The device connecting the binder with the shocker permits the latter to move independently of the former when passing over uneven ground, while a universal joint and a telescoping connection allow the shocker to assume almost any position without interrupting the power transmission.

INTERIOR DECORATIONS OF WHITE CEMENT

A recently constructed residence furnishes several examples of beautiful interior decoration with white cement. These include two reproductions of fireplaces, found in old French castles, and a white stair rail of intricate design. The effect produced is almost as beautiful as that of marble and, of course, the construction is far more permanent. The work here done with such skill indicates that there is a wide range of artistic uses to which this material can be put.

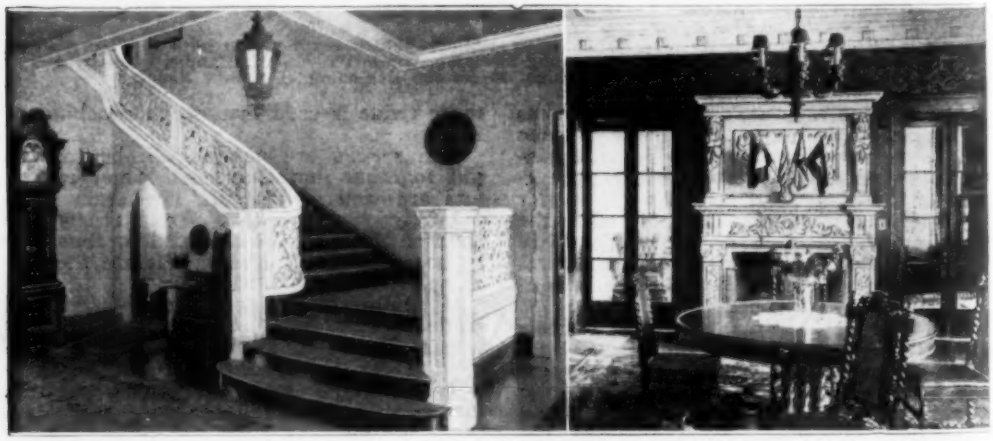
A Handsome Cement-Concrete Fireplace, Embellished with Raised Figures, Which is a Faithful reproduction of an Old Fireplace in Blois, France

FISH SCALES AND RUBBER IN NEW COMBINATION

After extensive experimenting, an expert in utilizing various by-products, believes he has found an important use for fish scales, namely as a reinforcement for rubber. The resiliency and toughness of this waste product is well known. The inventor of the new rubber compound claims that the cellular structure and the chemical nature of the scales are such that they readily combine with rubber and respond to sulphur treatment in the same manner as rubber. Thus, fish scales and rubber combined can be vulcanized to produce a substance that is tough and hard but, at the same time, elastic. The fields in which a hard, resilient rubber is needed are so numerous that this invention would appear to have almost unlimited possibilities if it fulfills the claims made for it.

COMPLETE APPAREL OUTFIT OF ASBESTOS FABRIC

The manufacture of articles of asbestos fabric has reached such a degree of refinement that a person can now be clothed from head to foot with apparel of fire-resisting material. A special treatment is given the asbestos to make it flexible enough for clothing and also to give it a suitable wearing surface.



Left, A Stair Rail of Intricate Design: A Striking Example of the Delicate Effects That can be Produced by Skilled Workers in Cement. Right: A Cement-Concrete Mantelpiece, Eight and One-Half Feet Long, Which Produces an Effect Almost as Beautiful as Marble and Is of More Permanent Construction

Outfits of this sort are designed especially for workers in foundries, chemical plants, metal works, glass factories, and for firemen needing protection against heat and burns. Not only is the asbestos fabric made up into complete suits, but also into helmets, leggings, mittens, aprons, gloves, and finger stalls. Hanging from the edge of the helmet is a flap which extends entirely down to the shoulders.

Left: Helmet Made Entirely of Asbestos, for Workers Facing Great Heat. Above: Glove and Mitten of Similar Fireproof Fabric

Leggings and Suit Made of Asbestos Fabric Rendered Pliable and Durable by Special Treatment

IRREVERENT TO USE FLAG AS MONEY RECEPTACLE

That the American flag should not be carried horizontally to be used as a receptacle into which money can be tossed, is the substance of a resolution recently passed by the Cincinnati Chamber of Commerce, and, at its instigation, by similar bodies in other cities. While the causes for which money is collected in horizontally stretched flags are conceded to be praiseworthy, it is pointed out that such usage is both undignified and irreverent.

CONTRACTORS' STORAGE YARD IS PROFITABLE

The storing of contractors' equipment and protecting it from the weather and thieves has proven a profitable line of business for a man of original ideas. Seeing that several builders were often compelled to leave their tools, machinery, etc., in vacant lots, when not in use, he leased a tract of land and soon had some 20 concerns as his tenants. The land was inclosed with a high fence, having gates which are locked each night. A shed at one side shelters rope, shovels, and the like, while sawhorses, concrete mixers, and so on, are stored in the open. Asphalt roadways make all parts of the yard easily accessible.

Yard in Which 20 Contractors Rent Space to Store Their Equipment: The Shed at the Left Shelters Rope, Shovels, Picks, and the Like. No Tenant has Ever Lost Any Material Kept Here

DISTINGUISHED ON THE FIELD OF HONOR

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American Soldiers at the Grave of Lieutenant Quentin Roosevelt in France: The Cross Bearing the Name of the Young Airman, Who was Felled by the Hun during an Encounter Last July, Takes the Place of One Erected by the Enemy, Who Buried the Body behind His Lines with Military Honors. The Grave was Found during the Allied Offensive in the Marne Salient

War Turns Almost Everything Topsy-Turvy and Produces Many Odd as Well as Touching Incidents. While There Is Nothing Especially Remarkable about the Picture Above, It Illustrates a Story of Unusual Human Interest. The Young French Officer with Back Turned is Decorating His Middle-Aged Father with the Croix de Guerre for Distinguished Service and Heroism in the Performance of Duty

STRAFING HUNS "OVER THERE" AND "OVER HERE"

Above is Pictured a Massed Battery of "75's" in Action during the Franco-American Offensive That Took Château-Thierry from the Hun and Marked the Beginning of the Enemy's Disaster along the Western Front. In the Distance Are Visible the Hills That Dominate Soissons, and from Them a Raking Fire was Later Directed against the German Defenses

Within the Great Steel and Glass "Conservatory" on a Bank of the River Rouge, near Detroit, Where "Eagle" Boats are being Assembled by Motor-Car Mechanics: A Submarine Chaser in the Course of Construction is to be Seen in the Background. The Building Has Three Double-Tracked Shipways Such as the One Pictured Ahead

PICTORIAL SIDE LIGHTS ON WAR ACTIVITIES

A World of Artistic Talent Abounds in the Navy. This Shows an Artist Jackie Spending His Leisure Time Painting a Picture on a Sailor's Hammock

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Save Fruit Stones and Nut Shells, and Help Defeat the Hun. The Striped Barrel Is a Street Depository for Peach, Plum, Cherry, and Apricot Seeds Which Supply Charcoal, Much Needed for Gas Masks

BRITISH OFFICIAL PHOTO

Many East Indian Troopers cannot Write Their Names; So When They Receive Their Monthly Pay Checks from the Army Paymasters They Indorse Them with Their Thumb Prints

BRITISH OFFICIAL PHOTO

This Photograph, Taken at a British Post on the Italian Front, Shows a Combination Post Office and Fire Station. At One Side Also may be Seen the "Town" Clock. Here Letters may be Mailed, Fire Alarm Sounded, and Fire-Fighting Equipment Obtained

TANKS, THE DREADNAUGHTS OF THE BATTLE FIELD

Thanks to Gasless Sundays, These Tanks Are in No Danger of being Berthed in a Roadside Shelter for Lack of Fuel. They are Merely Hidden from the View of Enemy Observers, Their Engines Ready to be Cranked at the Command to Advance

BRITISH OFFICIAL PHOTO

The Celtic Cross, Bearing near Its Base the Emblem of the Tank Corps, Marks the Grave of a Private of "D" Battery Who was Killed in Action in the Spring of Last Year

French Tanks have Distinguished Themselves No Less than the British. While of Much Different Appearance and Design, They are Constructed on Similar Lines and Operate with High Efficiency. This Shows Two of Them Maneuvering before a Crowd of Interested Spectators

AMERICAN "EAGLES" PREEN THEIR WINGS

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Showing the Variable-Angle Machine-Gun Mounting Installed at the Rear Cockpit of a De Haviland "4" Bombing Plane: Large Numbers of These Machines, Which Are of British Design, are being Manufactured in America and Shipped Abroad for Our Aeronautical Forces Overseas

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Proficiency in Gunnery Is a Prerequisite of Success in the Air, and Careful Attention is Paid to the Training of Pilots and Observers in the Use of Machine Guns. This Shows a Range at One of the Instruction Camps Where Student Airmen are Taught

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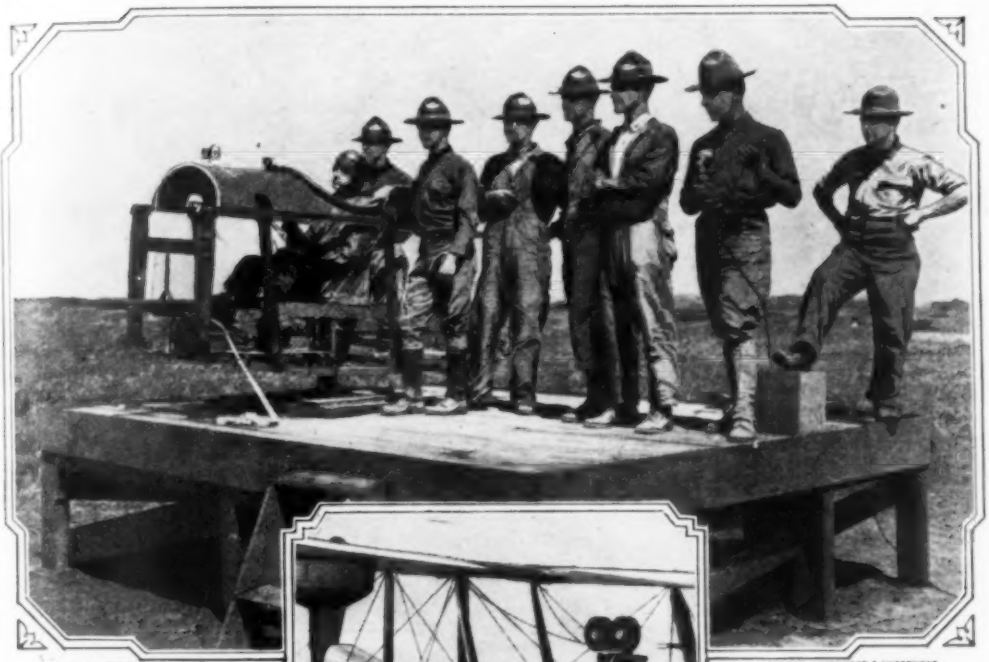
The Pilot is Intently Watching His Observer Direct a Stream of Bullets at a Fast-Moving Target. In the Air, Where Perfect Teamwork Is Vital, No Pilot Wants a Poor Marksman as a Gunner, and No Gunner Wants an Erratic Driver at the Wheel. So It Becomes the Duty of Each to Make Good in the Eyes of the Other

AND SHARPEN THEIR BEAKS FOR ATTACK



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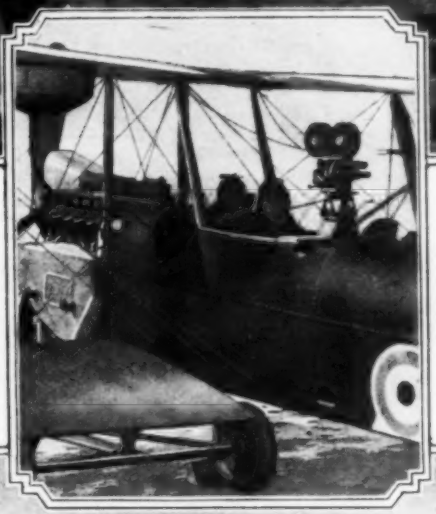
Above: Seated in Driving Position in This Pivoted "Dummy" Cockpit, Which Sways at the Slightest Motion, a Student Airman is Directing the Firing at a Moving Target. The Picture Shows One Phase of the Training Given at the Government's Schools of Aerial Gunnery



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The Plane Pictured at the Side is Equipped for Aerial Photography. Instead of a Gunner, It Carries a Camera Man in the Rear Cockpit, and Mounted Atop the Gunwale at the Back Is a Motion-Picture Camera. The Craft Is Ready to Start on a Photographing Expedition over the Enemy's Lines

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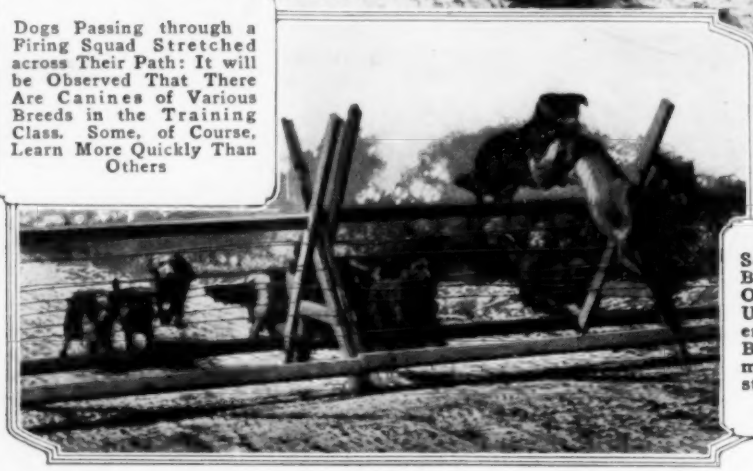
Here Is an Excellent View of a Liberty-Motored De Haviland "4" Bombing Plane, Such as is Now being Used on the Western Front by American Airmen. Advices Indicate That the Craft, Refined in Accordance with General Pershing's Suggestions, is Well Suited for the Purposes to Which It is Put

TRAINING DOGS AS ARMY DISPATCH BEARERS

Dogs can Carry Messages Much Faster Than Runners and for This Purpose have Proved Most Helpful. They are Thoroughly Trained at War-Dog Schools to Hear the Whiz of Bullets and the Roar of Shells without Flinching

Hurdling a Barrier of Brush and Wire with Grace and Ease: The Alert Animals Soon Become Adept at Surmounting All Sorts of Obstacles That Block Their Path

Dogs Passing through a Firing Squad Stretched across Their Path: It will be Observed That There Are Canines of Various Breeds in the Training Class. Some, of Course, Learn More Quickly Than Others



Some Dogs Are Far Better Hurdlers Than Others, but All That are Used as Dispatch Bearers Must be Able to Clear Barbed-Wire Entanglements and Similar Obstructions without Hesitation

PHOTOS COPYRIGHT, WESTERN NEWSPAPER UNION

MURDEROUS BOMB EXPLODED AT CHICAGO POST OFFICE

Four persons were killed and 30, or more, injured recently by the explosion of a powerful bomb in the Adams Street entrance of the Chicago post office. There seems to be little doubt that the crime was perpetrated by members or sympathizers of the I. W. W. Apparently it was done in an attempt to free William D. Haywood, convicted head of the anarchistic organization, who was a prisoner in the building at the time; or was intended as an act of retaliation for the conviction before Judge K. M. Landis of 93 members who were found guilty of disloyalty.

Workmen Clearing the Débris from the Adams Street Corridor of the Federal Building at Chicago, Following the Detonation of a High-Explosive Bomb

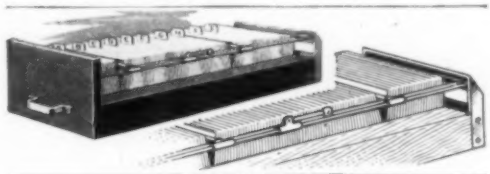
The bomb appears to have been of unusually good construction. Its explosion rocked the great building, badly damaged the entrance, killed a horse a block away, and injured many persons far from the scene.

PHOTOS COPYRIGHT, INTERNATIONAL FILM SERVICE

Débris That was Blown into the Street by the Terrific Force of the Explosion Which Occurred within the Building and Caused the Death of Four Persons and Injured Many More. A Horse, Nearly a Block Away, was Killed

DEVICE FOR CARD INDEX AIDS FILING CLERK

An attachment for card-index files has been devised which is very convenient for marking the place from which a card has been removed, by holding the other cards apart. The feature of the marker is a rod which is installed at one side of the drawer and on which are sliding arms having spherical ends. When a card is taken from the file one of the arms is moved along and turned down into the gap made by removing it. A second rod parallel with the first, holds the outstretched arm in a horizontal position.



Drawer Equipped with Markers Used to Indicate Places from Which Cards are Temporarily Removed

BIG FLYTRAP CATCHES BUSHELS OF FLIES

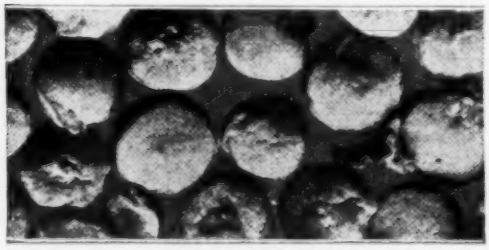
A flytrap, made from a butter tub and wire screening, has been used in catching an astonishing number of flies

Flytrap Made from a Butter Tub, and a Bushel Basket Overflowing with the Insects Captured in a Period of 10 Days

in a stable yard. In 10 days the insects captured more than filled a bushel basket. The trap was made by removing the bottom of the tub and covering that end with screening, while in the opposite end, which was placed downward and held a short distance above the ground by supports, a cone of screening was placed. In its apex, which projected into the tub, was a small hole through which the flies, following their instinct to climb upward, entered the trap.

QUINOA A SUBSTITUTE FOR WHEAT

Almost unknown to the civilized peoples north of the equator, there has long been cultivated on the west coast of South America a plant, called "quinoa,"



COURTESY OF THE BULLETIN OF THE PAN-AMERICAN UNION

Quinoa Grains Magnified Six Diameters: The Food Value of This South American Product is Comparable with That of Wheat, for Which It is Now Proposed as a Substitute

which botanists and cereal experts believe may prove an excellent substitute for wheat, in fact preferable to the substitutes now in use. This plant, now attracting particular attention because of the shortage of foodstuffs, has been cultivated in South America, in more or less primitive fashion, since pre-Inca days. Like maize, potatoes, tomatoes, etc., it may become one of the well-known foods introduced to the world by primitive American races.

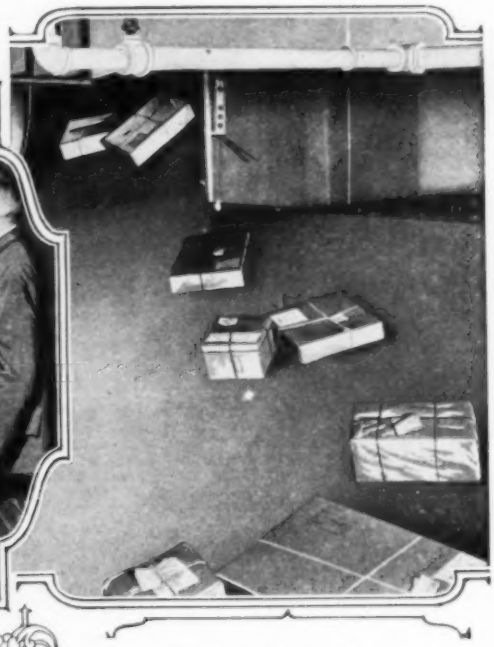
The Department of Agriculture has imported several lots of quinoa seed and seed of related species, and is making experiments with it in the hope of finding suitable soil and climate in this country for its cultivation. The plants are very hardy and thrive in cold regions of the Andes at an elevation of 11,000 ft. They usually grow 4 or 5 ft. high, and an analysis of the small, almost spherical grains, shows them to be rich in starchy matter and gluten.

CONSERVE PAPER AND HELP WIN THE WAR

"Save Waste Paper but *don't Waste Paper,*" is a slogan which the War Industries Board earnestly requests every business house, publisher, household, and individual to add to its list of "victory phrases." Many will be surprised to learn what a serious handicap the wasting of paper places on the makers of a new poison gas which our army chemists have developed, to beat the Huns at their own game. An essential element in this gas is sulphur, of which there is only a limited supply in the United States, and authorities declare that enough will not be available for gas making if we thoughtlessly waste paper, every piece of which contains some of the precious sulphur. Another reason for economy is that the government's requirements for stationery are greatly increased. Recently the War Department asked for 1,000,000,000 envelopes! Furthermore, from one to three tons of coal are consumed in producing a ton of paper, so that economy in the use of the latter also saves fuel.

HOW DEPARTMENT STORES DELIVER PURCHASES

1. The Upper End of a Double Spiral Chute, through Which All Non-breakable Cash, C. O. D., Charge, and Special-Delivery Packages Pass into the Sub-basement



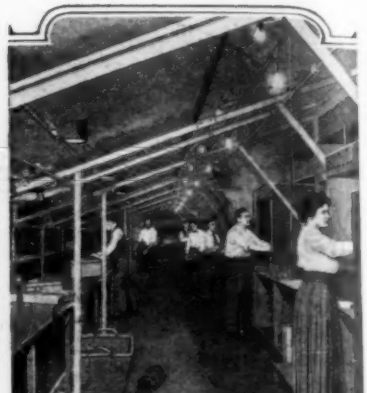
2. Packages Coming Down and Out of the Double Spiral Chute from the Ninth Floor onto a Long Assorting Table in the Credit Shipping Room

3. First Cut of the Alphabet: The C. O. D. Packages are All Thrown into the C. O. D. Conveyor, Where They are Taken to the C. O. D. Billing Department, Shown in No. 7. The Cash Packages Go on the Cash Conveyor Directly to the Final-Assorting Table, Shown in No. 8. Charge Packages are Sorted Alphabetically into Five Alphabetical Divisions. All Charge Packages Remain on This Table to be Put through the First Cut of the Alphabet

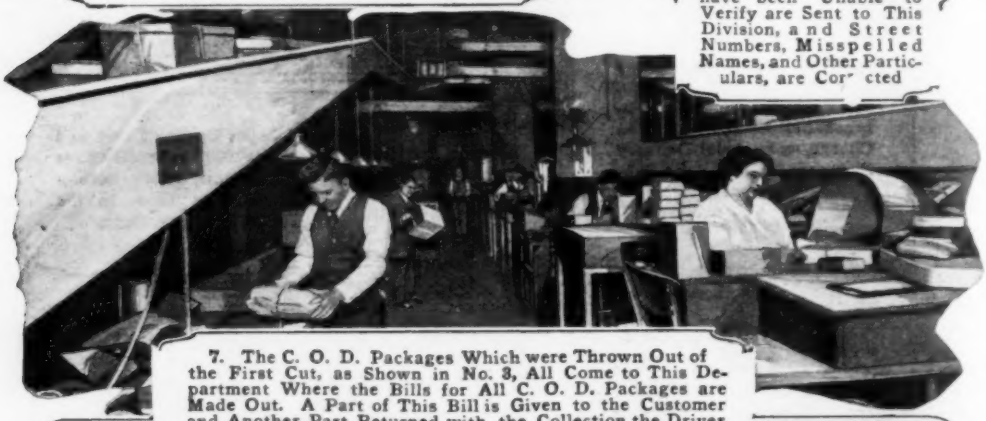
4. Second Cut of the Alphabet, Showing the Charge Packages Again being Cut Alphabetically: The First Girl Shown in the Illustration is Cutting the A B C Charge Packages Again into A-BA, BE-BRE, BU-CA, and So Forth. Here They Pass down the Chutes to the Charge Authorizers, as Shown in No. 5

WHY LABOR IS SAVED WHEN THE CUSTOMER

5. Here Charge Accounts are Verified Ready for Delivery. If the Name and Address on the Package does Not Correspond with the Name and Address on the Credit Sheet, or If the Addressee does Not have an Account at the Store, These Packages are Thrown Out and are Conveyed to the Department Shown in No. 6



6. Charge Packages That the Girls in No. 5 have been Unable to Verify are Sent to This Division, and Street Numbers, Misspelled Names, and Other Particulars, are Corrected



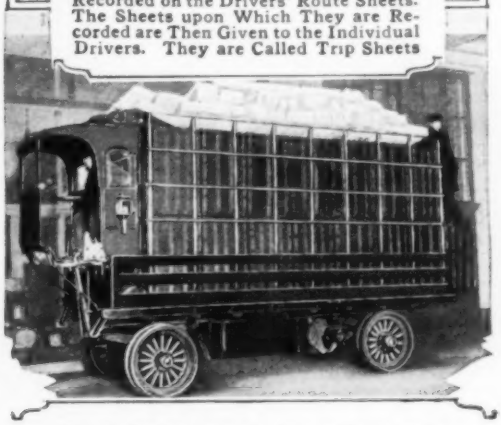
7. The C. O. D. Packages Which were Thrown Out of the First Cut, as Shown in No. 3, All Come to This Department Where the Bills for All C. O. D. Packages are Made Out. A Part of This Bill is Given to the Customer and Another Part Returned with the Collection the Driver Makes, Together with His Return-Trip Sheet

8. First Come-Together: This Table is Called the City Assorting Table. All the Cash Packages Which are Thrown Out of the First Cut of the Alphabet, Shown in No. 1, as Soon as They Come Down the Spiral Chute onto Conveyors, Go Directly to This City Assorting Table. C. O. D. Packages Go through the Billing Department and Then Here. The Charge Packages, Also Thrown Out of Cut No. 1, Pass through Numerous Assorting and Verifying Departments Until They Again Come Together on This Table. Packages on This Table are Assorted into Districts

9. This Photograph Shows Packages from One of the District Divisions Made in No. 8 being Divided into Drivers' Routes

10. The Packages are Here being Placed in Trunks Ready for the Drivers. The Entire History of Each Package is Recorded on the Drivers' Route Sheets. The Sheets upon Which They are Recorded are Then Given to the Individual Drivers. They are Called Trip Sheets

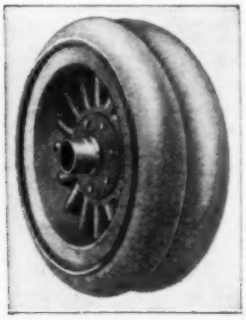
11. These Trunks are Filled with Packages of Merchandise, Locked, and are Now being Taken up the Escalator to the Trucks Which Carry Them to the Different Delivery Stations Where the Drivers Get Them and Rearrange Them According to Street Numbers



12. A Truck Load of Trunks Filled with Merchandise and Large Packages Just Starting on the Trip to One of the Delivery Substations: These Trunks will Here be Again Assorted According to the Number of Drivers That Handle the Route

GREATER MILEAGE CLAIMED FOR CURVED SOLID TIRES

Solid dual tires, of semicircular cross section, that conform in design to European type, are being introduced for trucks. Among the several advantages claimed for them are greater resilience and mileage. This accrues, it is said, because of their curved shape, which makes them higher and, at the same time, the thickness of rubber in the treads greater, than is true of American tires of coventional design. Hence the inside tire when rolling on a crowned road, compresses sufficiently to allow the outside one to carry its proportional share of the load.

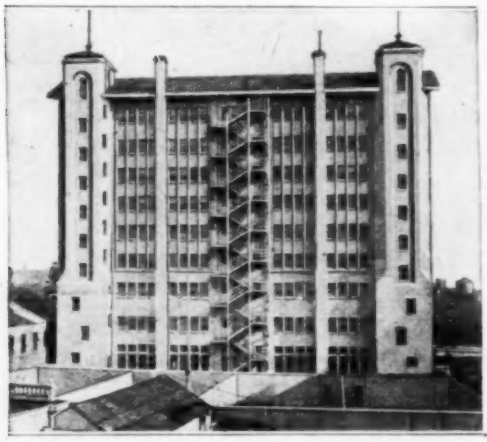


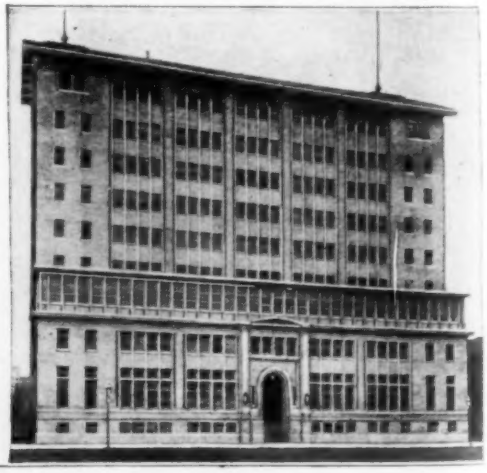
NEW DETENTION HOME LOOKS LIKE HOTEL BUILDING

San Francisco has of late erected a new detention home that has a number of interesting features. It is a tall, narrow building of modern fireproof construction and has no bars at its windows. Escape from the structure, however, is not so easily accomplished as one might be led to assume. The windows are fitted with steel frames that are divided into small squares fitted with panes of glass. The divisions are too small to permit a person of average size to pass through them, should he break the glass. The fact that the building, the ground dimensions of which are 36 by 158 ft., is high, instead of being spread out with floors near the street level, also tends to discourage attempts to escape. This arrangement has been adopted to save the building from a jaillike appearance, which would be undesirable for an institution of its purpose.

COTTON-CLOTH SUBSTITUTE FOR SILK POWDER BAGS

At the present time millions of yards of silk are used in making bags in which the heavy-artillery powder charges are placed. Because of the growing scarcity of this material, special interest centers in tests now being made of a cotton-cloth substitute which is treated by a chemical process. If it proves satisfactory it is said that a saving of many millions of dollars will be made by the Ordnance Department. A trial order for 5,000 yd. of the specially treated cotton fabric has been placed with a reliable concern.





At the Left Is a Rear View of the San Francisco Detention Home, While at the Right Is a Front View Showing the Large Sun Parlor That Extends across the Full Width of the Structure at the Third Floor

PORTABLE SERVING TABLE SAVES DINERS' TIME

A new accessory now being introduced into hotels and restaurants, gives the patrons the advantages of a cafeteria, including quick service and an opportunity to inspect the food before making a selection, without making it necessary for the diner to wait on himself. The new time-saver is a large food container mounted on rubber-tired wheels and designed to be moved about the dining room by the waitress, who serves the guests from it at the same time that she takes their orders. These portable serving tables are built in two styles, one for meats, vegetables, and soups, and the other for beverages, desserts, etc. The latter has two principal shelves, the lower of which is occupied by trays for cups, saucers, glasses, and tableware, while the one above has coffee and tea containers kept warm by a previously heated asbestos pad, and milk containers kept cool with ice. Above these are three small shelves for pies and French pastry.

A Portable Serving Tray Which Gives Restaurant Guests the Advantages of a Cafeteria without Their being Required to Wait on Themselves: This Carrier is Designed for Hot and Cold Drinks and Pastry, in Addition to Dishes and Tableware

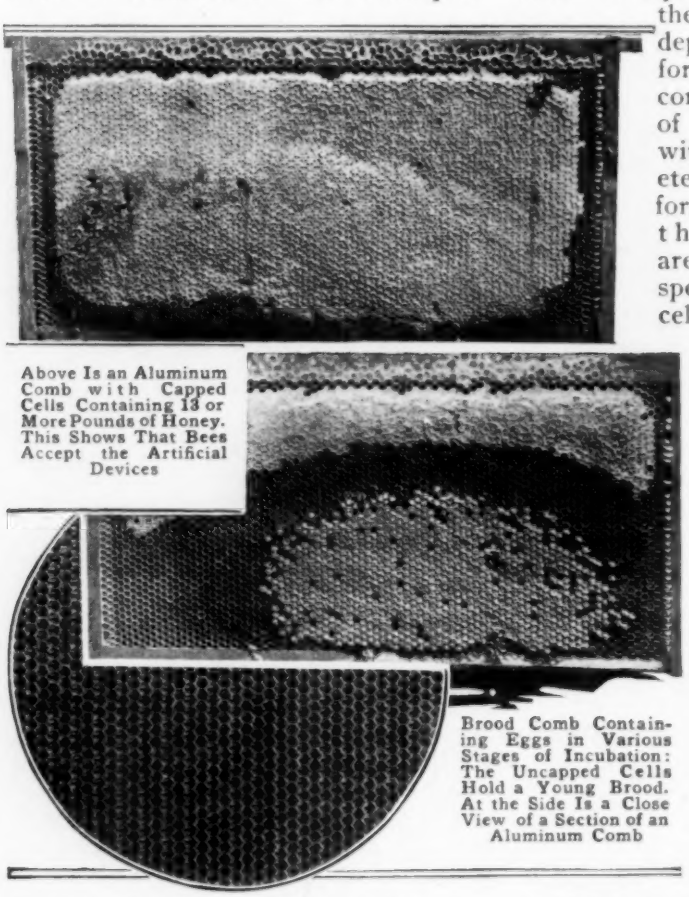
SUBMERGED PEN HELPS KEEP PIGS CLEAN

By fencing in a portion of an irrigation ditch and connecting it with an adjoining pigpen, a western ranch owner has provided an inclosure in which his hogs keep much cleaner than formerly. Care was taken to make the fence break-proof below the water as well as above it. The dirt bank over which the animals pass in going to and from this submerged pen is covered with boards, to which cleats are attached, so that the dirt beneath is not carried away or worked into mud. The bed of the ditch at this point is of such a character that when the hogs seeking relief from the hot sun, congregate in the water, they do not become mired, but are able to walk about without danger of being drowned.

Submerged Portion of a Pigpen Made by Extending the Hogs' Inclosure into a Near-By Irrigation Ditch: The Animals Thoroughly Enjoy the Unusual Facilities and Are Much Cleaner Because They Use Them

EMPLOY ARTIFICIAL COMBS TO CONTROL SEX OF BEES

Beekeepers are manifesting interest in artificial combs made of aluminum, which are claimed to increase the production of workers and limit the number of drones. Another outstanding feature of the invention is that it relieves bees of the necessity of building wax combs, and thus enables them to devote all their energy to honey making. Being of metal construction, the combs will not melt in excessively hot weather. Furthermore, in the event of infection occurring in a brood, the cells may be thororghly sterilized. In view of the request of the Department of Agriculture that keepers of bees market only extracted honey, so as to increase production by reusing the combs, the new aluminum devices seem particularly timely. They may be used indefinitely, are of standard size, and weigh about four ounces each. The cells consist of aluminum ribbons which are shaped by being passed between crimping rollers. By making the honeycombs double depth, they cannot be used for brooding. The brood combs, for the production of workers, are supplied with cells $\frac{3}{16}$ in. in diameter. Since it is impossible for the queen bee to enlarge the holes, only females are produced in them. A special brood comb with cells $\frac{1}{4}$ in. in diameter is provided in which the queen may lay eggs for drones. This arrangement not only makes it possible to control the proportion of male and female bees, but also is said to permit blood control so that excessive inbreeding is prevented. Before being placed in hives, the combs are sprayed lightly with wax.



Above Is an Aluminum Comb with Capped Cells Containing 13 or More Pounds of Honey. This Shows That Bees Accept the Artificial Devices

Brood Comb Containing Eggs in Various Stages of Incubation: The Uncapped Cells Hold a Young Brood. At the Side Is a Close View of a Section of an Aluminum Comb

When it is considered that bees expend as much energy in making a pound of wax as they do in gathering 20 lb. of honey, the potential value of these artificial combs apparently should prove to be considerable.

AVIATOR, HOME FROM FRONT, HAS NARROW ESCAPE IN AIR

One of Canada's airmen, home on furlough, miraculously escaped death in a peculiar aeroplane accident at Vancouver, B. C., some days ago. He was flying a biplane that had been accepted by the Forestry Department of British Columbia for use in patrolling timber lands for the detection of fires. While over the city, out of reach of a good landing place, something happened to

The Machine was Wrecked in the Crash, but the Pilot, Despite the Fact That He was Hurled through the Hole Smashed in the Roof, Escaped Serious Injury

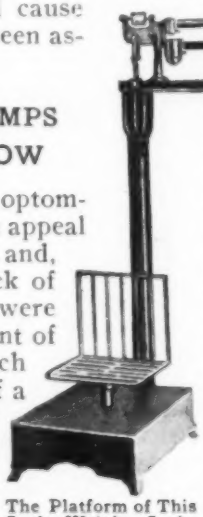
the craft, and it plunged at high speed against the roof of a frame house. The machine was completely wrecked. Although the pilot was hurled through the roof, into the house, he escaped serious injury. The fundamental cause of the accident has not, so far, been ascertained.

VALUE OF THRIFT STAMPS TOLD IN SHOW WINDOW

The window display of an optometrist recently made an effective appeal for the purchase of thrift stamps and, incidentally, advertised his stock of lenses. Two 25-cent pieces were mounted in the window. In front of one was a magnifying glass which made the coin appear the size of a dollar, while a lens in front of the other made it look smaller than a dime. The captions under the respective money pieces read: "Here's What will Happen if You Invest a Quarter in a Thrift Stamp," and "Here's What will Happen if You don't Buy."

SCALE HAS ATTACHMENT FOR GRAIN WEIGHING

A new scale for millers is so made that sacks of grain or flour can be filled on it and weighed accurately, regardless of the amount of material that in the filling may be spilled around the container. The platform is protected by a stationary metal case having a hole in its center through which passes an upright from the scale platform to a grate-like support. The sack to be filled is placed on the latter, and what grain falls onto the casing in no way alters the weight shown by the scale.

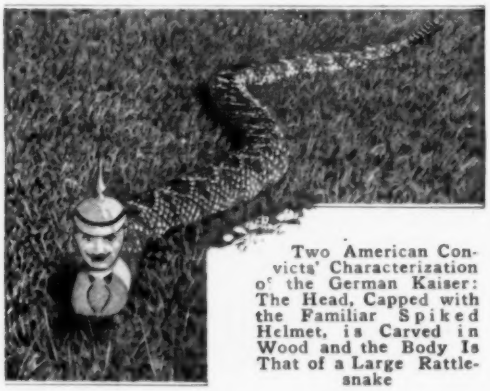


The Platform of This Scale Weighs Sacks of Grain without Including the Spill

¶The school children of Cleveland are being given special instruction in how to cross streets, the purpose being to lessen the number of street accidents which have been occurring with appalling frequency.

CONVICTS PLACE KAISER'S HEAD ON SNAKE'S BODY

One of the most telling characterizations of the German war lord which has been brought out since the beginning



Two American Convicts' Characterization of the German Kaiser: The Head, Capped with the Familiar Spiked Helmet, is Carved in Wood and the Body Is That of a Large Rattlesnake

of the war, is that made by two convicts in one of our state prisons. These men stuffed the skin of a large rattlesnake and provided it with a carved representation of the kaiser's head. "If you will put a picture of this snake in your magazine," writes one of the men, "the kaiser may see it and realize how patriotic even the convicts in America are."

REPAIR PLANES IN FIELD WHENEVER POSSIBLE

Through the inauguration of a new system of handling damaged planes at one of the flying fields, it is hoped to reduce shop work 50 per cent. Repairs are being made in the field whenever possible. When a machine falls or is otherwise disabled, its pilot, if uninjured, notifies the wrecking department whether or not the repairs can be made by dispatching new parts and mechanics to the scene. If the plane needs shop attention and is not more than 100 miles from the field, a motor truck is sent out for it. When it is farther away, men are sent by train to dismantle the machine and return it by express, providing the repairs cannot be made on the ground. Thus avoidance of unnecessary dismantling and long hauls over rough roads is achieved.

COMMUNITY "THRIFT HOUSE" PROFITABLE WAR SHOP

Splendid success has attended the war activities of the Drama Club of Evanston, Ill., which some weeks ago established a salvage shop known locally as "Thrift House." Although the idea is not strictly original, it is thoroughly practical and might be utilized almost anywhere to advantage.

Free use of a large old house, well located, was obtained. By enlisting the coöperation of local firms and individuals, the entire building was cleaned, redecorated, and furnished, for the purpose to which it was to be put, practically without cost to the organization. The plan of having residents of the town contribute various household and personal articles, for which they had no further use, met with immediate response. Within a few days "Thrift House" was filled with marketable things of all descriptions. Cast-off wearing apparel formed a part of the donations, but many other things, such as valuable paintings, exquisite pieces of lace, jewelry, books, glassware, valuable old china and pottery, antique silver, sterling candlesticks, table lamps, and bric-a-brac were donated.

A gift shop was established, a dainty tea room opened, and millinery, clothing, and household departments formed. The net profit for the first six weeks amounted to $1,300. The first check forwarded to the Franco-American Corrective Surgical Appliance Committee, in behalf of which the activities of "Thrift House" are maintained, amounted to $1,000.

The scheme is one that might be made of value to any community. Many homes hold articles of value that are proverbially in the way. In some other homes they might fill a real want. Donations of such things usually do not represent sacrifices, except occasionally perhaps to sentiment—which has few legs on which to stand in war time. Purchase of such articles at a war shop, on the other hand, may be indulged in for the reason that all of

One Corner of the Gift Shop at "Thrift House," Showing Character of Donations Made to the War Cause Which the Establishment is Supporting

the money goes to a war cause. The millinery and household departments of "Thrift House" do a certain amount of remodeling work. This is a phase of the undertaking that might well be developed fully. A well-organized reclamation shop would serve a most beneficial purpose in any one of a thousand towns and cities. Properly carried out, the work would be classified and placed in charge of women especially adapted and trained for it, and conducted on a business basis.

A Glimpse of the Tea Room Where North Shore Débutantes and Young Society Women Have Charge: At the Side is Shown a Section of the Millinery Shop

Excellent opportunities are afforded for remodeling slightly used millinery and making it really attractive for women and girls whose circumstances do not permit the purchase of artistic and becoming hats of fine quality. By steaming, reshaping, lining, and redecorating, as needed, millinery in adept hands is easily and inexpensively rehabilitated.

The present popularity of painted and decorated furniture, as well as the steady demand for chairs and tables and bedroom suites of early American periods, opens the opportunity of profitably devoting energy to the refinishing of certain articles in accordance with present-day tastes, and the reupholstering of others that are of value because of their old designs. Many homes are cluttered with furniture of half-century or greater age that is an eyesore to its owners, and yet, if properly rehabilitated, the very thing that scores of persons are searching secondhand stores of large cities in the hope of finding.

The chances of cleaning and repairing cast-off clothing of good quality so as to make it fill a real service for those who are glad to purchase fine materials and fabrics, even though they have been used, are obvious. On the other hand there is even as good opportunity open to those who are able to weave artistic rugs, draperies, mats, table covers, and similar articles from old materials that otherwise would be of little or no value. Very handsome things can thus be made, and the work of doing it, when handled by those who are capable and resourceful, is most interesting.

Jewelry and household silverware that is tarnished and out of repair, may be made to look like new and sell for good prices. Special training in an arts-and-crafts and metalwork school, or some similar institution, would soon fit one for undertaking such an endeavor successfully. Old-fashioned silver for which many persons no longer care, may be worked over into hammered and tooled pieces of artistic and utilitarian worth. Articles that are of value because of their period, origin, history, or character, need only to be repaired and polished.

One of the good features of a thoroughgoing community institution of this sort lies in the fact that the termination of the war need not necessarily mean the termination of the salvage work. Continued as a welfare project, it might easily be made to place local charitable undertakings on a self-supporting basis.

JAPANESE MILK CART HAS ODD COPPER BODY

The attention of a foreigner when visiting the larger cities of Japan is quite apt to be attracted by passing two-wheel carts drawn by natives, each cart laden with a casketlike container of sheet copper, profusely lettered on the outside. Far from being funereal in character, these carriers are used in delivering bottled milk to hotels and well-to-do Japanese. Each cart has a capacity of about a gross of small, long-neck bottles provided with rubber stoppers. Owing to the density of the population in the island empire, grazing land is very scarce and cows are few. For this reason cow's milk is not the common article of food it is in America.

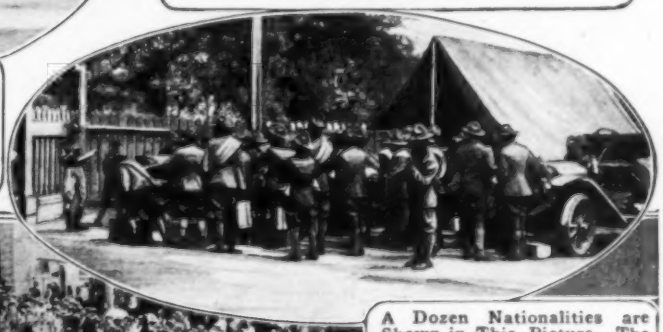
A Japanese Milkman and His Cart: The Casketlike Container in Which Bottles of Milk are Kept Is of Sheet Metal

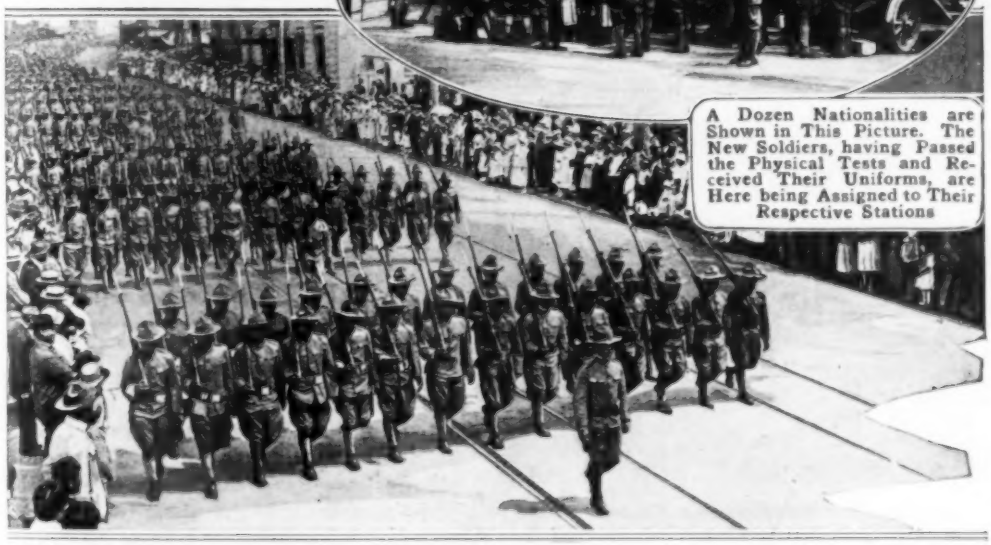
¶The Germans are now using a chasing plane equipped with an 11-cylinder engine which develops 260 hp. and drives a four-blade propeller.

DRAFT IN HAWAII CALLS MEN OF MANY RACES

Typical Group of Drafted Men Leaving the Armory in Honolulu on Mobilization Day: In Few Other Places under the Stars and Stripes Was There Such an Intermingling of Orientals and Occidentals When the Select Men were Called

Arrival at the Mobilization Camp: Men are Lined Up before the Doctor's Tent and Quartermaster's Tent for Inspection and to Receive Equipment





A Dozen Nationalities are Shown in This Picture. The New Soldiers, having Passed the Physical Tests and Received Their Uniforms, are Here being Assigned to Their Respective Stations

The Transformation Wrought by Two Weeks' Training in the United States Army: A Fortnight Before, These Men Looked Like Those Shown in the Upper Left-Hand Corner. Here They are Parading through Honolulu's Streets in Celebration of Thrift-Stamp Day

In the Hawaiian Islands, where the Orient and Occident meet, the operation of the draft law has been marked by interesting features not present in the United States and its other possessions. In few, if any, other places have there been such large percentages of orientals selected. Over 5,000 men were inducted into military service in response to the July, 1918, call. Of these, 52 per cent were Filipinos, nearly 3 per cent Koreans, 12 per cent Japanese, nearly 8 per cent Portuguese, nearly 13 per cent Hawaiian and part

Hawaiian, 4 per cent Chinese, 5 per cent white, and 2 per cent Porto Rican. The percentage of Filipinos was high because a large number of young unmarried men of that race have been brought to Hawaii to work on plantations.

The territory is particularly proud of the fact that it had to furnish no men for the first-draft quota because of credits which were given for all men enlisted in the National Guard. The average credit for such enlistments in the United States was 40.42 per cent, while Hawaii's credit on the first-draft quota was 182 per cent.

FOUR-WHEEL WINDMILL USED FOR FARM IRRIGATION

Water is pumped for irrigation purposes on a western Kansas farm by a multiple windmill. The installation

The Big Windmill Operates a 300-Gallon Pump That Discharges into the Irrigating Ditches

has been in service for some little time and is reported to be giving satisfaction. A crossarm supporting four 10-ft. wheels is mounted on roller bearings so that it is free to swing as the direction of the wind varies. A governor is employed which controls the operating speed of the mill and prevents racing when high winds prevail. Water is raised from a depth of 45 ft. by a 14-in. pump that delivers 300 gal. a minute. The equipment represents an investment of about eight hundred dollars.

GERMANS MAKE SUBSTITUTE FOR LINEN AND JUTE

The textile manufacturers in Germany, being increasingly hard-pressed for raw materials, have evolved a new substitute for jute and linen which has been named "textilit," and for which considerable merit is claimed. According to German newspapers it is a mixed product, the result of a paper thread and a fiber thread twisted together. Weaving and sewing yarns, and also bags, are made from it. More than a score of factories are now reported to be engaged in producing this substitute.

A recent order issued by the Imperial Clothing Office sheds additional light on the straits to which the enemy has come in the matter of fabrics. It states that purchase certificates for bed linen and for other materials for the making of the same will henceforth be issued only for sick persons and on a physician's certificate. All other applicants must be directed to buy paper-yarn products.

CATAPULT MAKES DEPTH BOMBS MORE DEADLY

The Navy Department has recently made it known that the method of depth bombing, known as "bracketing," used by the destroyers in attacking submarines, is proving most effective. The missiles are dropped by means of an ingenious catapult which discharges several at one time. The bomber's efforts are largely confined to dropping one of the bombs on the spot where the submarine was last seen and simultaneously other bombs are hurled, one 100 ft. forward, another the same distance to the rear, and others 100 ft. to the left and right, so that the hidden craft is almost sure to be caught in the region of detonation.

TWO SCHOOLS OF WHALES STRANDED ON ISLAND

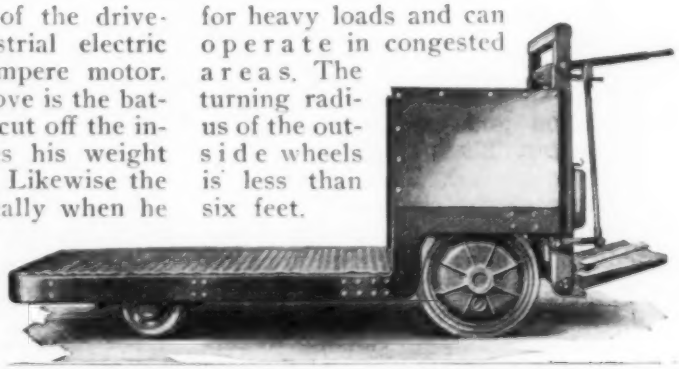
Perhaps the biggest fish story that has ever come from Nantucket Island, Mass., has to do with the stranding of two schools of blackfish on Cliff bathing beach. These mammals, which are a species of small whale, appeared late this summer. The first school, 59 in number, of its own accord swam into shallow water and was easily caught. The second school, containing 128 creatures, some of which weighed two tons, were driven ashore by fishermen who took advantage of the blackfish's instinct to remain in schools and make for shore when frightened. The fish were all killed on the beach and some steaks were cut from their carcasses. Because of lack of facilities on the island it proved unprofitable to utilize the large amount of valuable fat and oil in the bodies, and so most of them were finally towed out to sea and set adrift, having been of little profit to their captors. The oil in the carcasses was estimated to be worth several thousand dollars.

A Few of the Scores of Blackfish Caught in Shallow Water on Shore of Nantucket Island and Slaughtered by Fishermen

Part of the School of 128 Blackfish Which were Killed: Because of the Lack of Proper Facilities for Utilizing the Material, the Slaughter Was of Little Profit

MOTORS BUILT IN WHEELS OF WAREHOUSE TRUCK

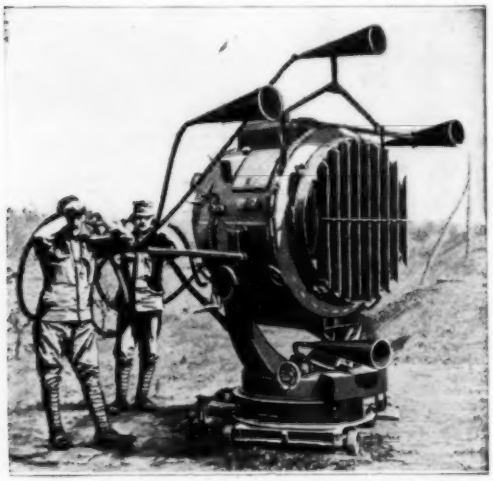
Incorporated in each of the drive-wheels of a new industrial electric truck is a 35-volt, 30-ampere motor. Mounted immediately above is the battery box. The current is cut off the instant the driver removes his weight from the rear platform. Likewise the brakes are set automatically when he withdraws his foot from the pedal. The load capacity of the truck is 4,000 lb., and its range of speed from two to seven miles an hour. The truck is built for heavy loads and can operate in congested areas. The turning radius of the outside wheels is less than six feet.



The Current is Cut Off and the Brakes Applied When the Driver Steps from the Operating Platform at the End of the Truck

ENEMY COMBINES LISTENING POST AND SEARCHLIGHT

Powerful searchlights equipped with sound detectors are used at the anti-



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Austrian Soldiers Demonstrating Method of Using Searchlight with Sound-Detecting Equipment

aircraft posts of the Austrians along the Italian front. The microphones enable the operators to direct the light shafts of the high-power lamps on raiding aeroplanes at night more quickly and with less difficulty than when the listening posts and searchlight batteries are separate, which, as far as known, has heretofore been the general practice.

"BLACK ALKALI" DESTROYS FERTILITY OF FARM LAND

Subirrigation seems to be indirectly responsible for the almost complete loss of fertility of a half million acres of land in Colorado's San Luis Valley. Evaporation and capillary attraction have brought "black alkali" to the surface of the ground. This is carried in the waters of the rivers and artesian wells of the valley, and consists chiefly of sodium carbonate. Agricultural experts believe that by using large quantities of gypsum to convert the carbonate into sulphate, and resorting to surface irrigation, the fertility of the soil may be restored.

SPANISH-AMERICAN AERIAL TRANSPORTATION PROJECT

Establishment of aerial passenger and mail service between Spain and the United States is being given serious study in the former country. King Alfonso is reported to be much interested in the proposal, and a large steamship company is understood to be ready to finance the undertaking. Although there is no information to show that actual steps have been taken to carry out the enterprise, it embraces the manufacture and operation of a fleet of enormous flying boats capable of carrying 40 persons as well as a considerable amount of mail. It is estimated that service could be maintained profitably by charging $400 for passage, and $1 for mail matter weighing 3½ oz. or less.

ANTIQUATED WAGON SERVES AS REMOTE POST OFFICE

Ranking among the strangest places in which the United States postal authorities have "set up shop" for the convenience of the public is the post office of Neenach, Calif. In an all but trackless semiarid region stands what was once a large inclosed conveyance, apparently used for overland travel. Its wheels are half-sunken in the sand and adjoining it is a little fenced-in area where a horse is kept. On one side of the structure, which is entered by wooden steps at one end, is a sign which reads: "Neenach Post Office."

One of the Oddest Post Offices in the United States Set Up in a Semiarid Region in Southern California for the Benefit of Pioneers

Here mails arrive and depart for the benefit of the courageous pioneers who are reclaiming this region.

URGE GRAIN MEN TO GUARD AGAINST DUST BLASTS

Dust explosions in threshing machines, grain elevators, and mills have caused so much damage to food and machinery in recent months that the Department of Agriculture has started a nation-wide campaign against this menace. Every thresher is urged to equip his outfit with an effective fire extinguisher, to install special smut or grain-dust collecting fans, and to ground the machine with copper wires for carrying off static electricity. Equally important measures, including the prohibition of smoking near the buildings, and the use of open flames, lanterns, etc., in dusty atmosphere, are earnestly brought to the attention of mill and grain-elevator owners.

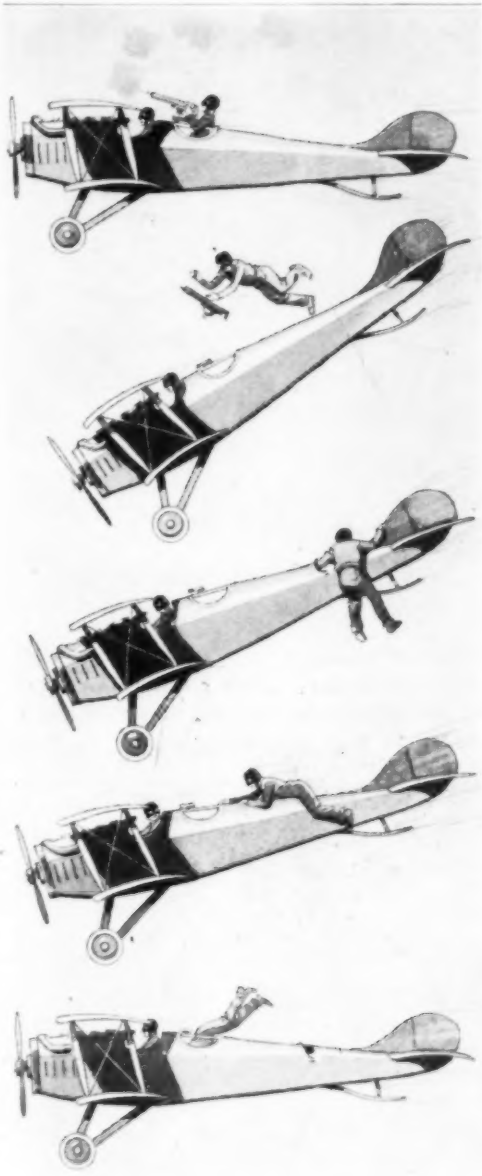
PROVISIONAL LIMB WORN INSTEAD OF CRUTCHES

Inmates of a British hospital for limbless soldiers and sailors have materially benefited, it is said, by the use of provisional limbs in preference to crutches. This practice prevents the atrophy that may result from too long disuse of the stump of a leg, and enables the patient to gradually adjust his body to the new condition. Constant wearing of such a limb also aids in bringing about the proper shrinkage of the stump. The limb used is of simple construction without a knee joint, the lower half consisting of a pin that can readily be adjusted for any desired height. The socket for the stump is well padded.

COURTESY OF THE LANCET, LONDON

¶ Partly filled thrift-stamp cards should be completed before the end of the year and exchanged for war-savings stamps. Thrift stamps do not bear interest, but war-savings stamps do.

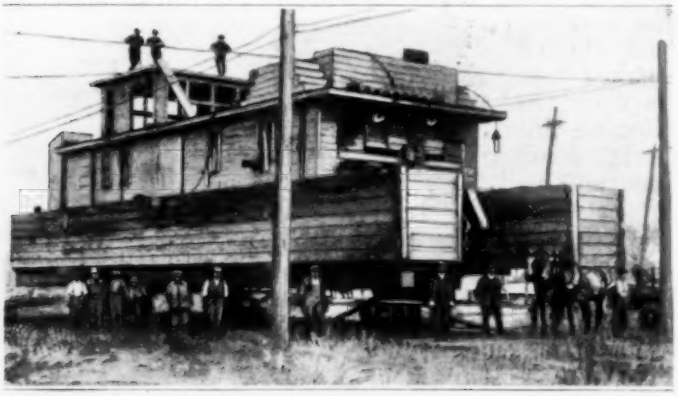
AERIAL OBSERVER ESCAPES DEATH MIRACULOUSLY



WONDERS have not ceased. An aerial observer, before a flight at one of the flying fields recently, forgot to strap himself in. When 2,000 ft. aloft, the pilot suddenly turned the nose of the plane downward. The observer was thrown into mid-air. As he fell, his left elbow struck the tail of the craft and broke through the fabric. He clung on and climbed onto the top of the fuselage while the plane raced ahead 120 miles an hour. Attracted by other airmen, the pilot throttled the machine. The observer then scrambled forward and crawled head first into the cockpit unhurt.

HYDRAULIC DREDGE TAKES LONG TRIP OVERLAND

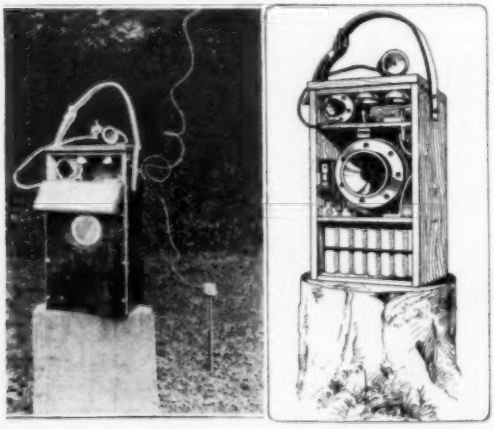
To transform a large hydraulic dredge, built for service in the water only, into a land-going craft was the difficult problem confronting an engineering firm which decided to move its dredge overland to a new site without taking it apart. By removing the gantries, hoist, and ladder frame, the weight was reduced to 180 tons, after which it was mounted on three eight-wheel trucks, the wheels being 30 in. in diameter and having 18-in. tires. A windlass, operated by a team, drew the dredge slowly along its course of several miles,—five street-car tracks and one main-line railway having to be crossed during the haulage.



Hydraulic Dredge, Weighing 180 Tons, being Drawn Overland: In This Journey of Several Miles Five Street-Car Tracks and a Busy Railway Line had to be Crossed

FOREST RANGERS' PHONE CAN BE HEARD A MILE

By combining a well-known type of automobile horn with a portable telephone set, an engineer has provided a telephone and signaling outfit that is invaluable to forest rangers in the West. With it they cannot only telephone in the usual way but can summon men a mile or more from the instrument. The energy to operate the relays forming part of the set is furnished by a special magneto which delivers either direct or alternating current, the instrument being adjusted so that one will sound the horn and the other the bells. With an induction coil and interrupter distant stations, properly equipped, can be called. In a recent test signals were successfully sent across a 100-ft. gap in the wire.



Forest Rangers' Portable Telephone Set: The Receiver and Transmitter are Located Above, While the Signal Horn Is Just behind the Perforated Disk in the Center of the Front. Below the Horn Is a Battery of Six Dry Cells

QUANTITIES OF MOSS USED IN SURGICAL DRESSINGS

Professors' wives in the University of Washington, at Seattle, claim the honor of being the first in this country to prepare sphagnum as a surgical dressing. This moss is very abundant in many regions, notably along the northwestern coast of America, and because of its softness and absorbent properties is proving a wonderfully successful substitute for absorbent cotton. In the first few months of their work, the wives of the faculty members, in conjunction with the Seattle Red Cross, prepared and shipped to France thousands of surgical dressings and hundreds of ambulance pillows. Later

Running the Moss-Filled Pads through an Electric Wringer, Preparatory to Shipping Them to France for Use in the Hospitals

A Pile of the Sphagnum Pads Ready for Shipment: They are Sterilized on Reaching Their Destination

A Student in the University of Washington, at Seattle, Sorting Sphagnum Which is Proving Such a Satisfactory Substitute for Absorbent Cotton in Wound Dressing: This Moss Is Very Plentiful in Marshy Regions in the Northwest

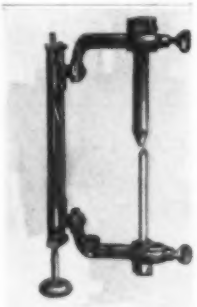
the women students in the university and women in many other states have taken up this work of mercy with eagerness.

The moss is often found in layers several inches thick in marshy places, and when dry is light and rather brittle. Because of the character of its cellular structure it is able to absorb several times as much moisture as absorbent cotton made into pads. These moss pads have the further advantage of not adhering to the wounds. Each is made by placing a given quantity of the sorted moss between a sheet of wood-pulp paper and a layer of non-absorbent cotton, and folding the whole in a certain manner without sewing the ends, after which it is placed in a piece of gauze and run through a wringer.

¶In August this country completed 88 seagoing ships, 49 of steel and 39 of wood, with a total of 283,099 gross tons.

IMPROVED CARBON HOLDER FOR STEREOPTICONS

An improved carbon holder for arc lamps in stereopticons, and the like, differs from the common type in that the bottom bracket, as well as the top one, can be adjusted to take carbons of various sizes. This bracket, in the 10-ampere lamps, will take a carbon of any size from 5/16 to 3/4 in. A special clamping device, controlled by a thumbscrew, gives it this wide range. With this holder the carbons can also be adjusted sideways as well as vertically, so that perfect alinement can be maintained and the light focused on the center of the lens. A holder for 35-ampere lamps is similarly designed.



"BOMBED!"

Warships Versus Air Craft

BY LEWIS R. FREEMAN

The text of this article has been passed by the British Admiralty Censor.

OF all the various classes of warships, the destroyer—on account of its speed, the readiness with which it is handled, and the fact that it presents a comparatively small target—is the one which has the least to fear from aerial attack. To a swift destroyer with plenty of sea room and no especial work to be interfered with, an attack by seaplane or Zeppelin is hardly more than a good appetizer, and as such a thing, to be sought rather than avoided. Hard as it is to hit a swift-flying air craft with a single high-angle gun, it is generally reckoned that the former is in quite as much danger from a destroyer's shells as the latter is from the air craft's bombs. If a destroyer has scant sea room, however—either through the proximity of mines or shoal water, or for any other reason—its speed and handiness are greatly reduced, and a combat under such conditions is rather less of a sporting proposition than when there is plenty of space to dodge about in. Worst of all, from the destroyer's standpoint, is to be subjected to an aerial attack in harbor without steam for full speed up, or with no room to maneuver in if there is steam. As such an attack is the only kind I have any personal experience of, I will set down a brief account of what it was like before recording several stories I have recently heard, from men who figured in them, of fights between air craft and warships at sea.

It was while I was off for lunch in a British destroyer of one of the Mediterranean flotillas lying in Saloniki Bay in the spring of 1917, that a signal was received stating that enemy aeroplanes had crossed the lines in the vicinity of Lake Doiran and were headed south, presumably with the intention of bombing military establishments on the coast. As similar signals had been sent out a number of times in the previous months, and as the raiders, when not turned back as was usually the case, had been concentrating their attentions on the camps and hospital areas (both some miles from the harbor) no attention was paid to this one. I recall distinctly that the only effect it had was to deflect a young officer from a highly diverting string of reminiscences about the monasteries of Mount Athos, which he had recently visited, to the latest tales of the pleasant little doings of the recently reinforced German bombing squadron operating on the Macedonian front. He was just telling us about a Hun pilot, brought down by the French, in whose diary was found an entry describing with much enthusiasm how he had blown up a wing of a hospital at Monastir on a former raid, being greatly aided in the feat by the fine way the Red Cross on the roof showed up in the sights of his bomb-dropping contrivance, when the rattle of hard-pumped anti-aircraft guns from somewhere beyond the town indicated that the threatened raid had materialized.

Since there was little of novelty to anyone at table in an air attack, no one seemed to be sufficiently interested to go on deck to see how it was developing, even after the fire of the guns about the town had increased to a steady drumming.

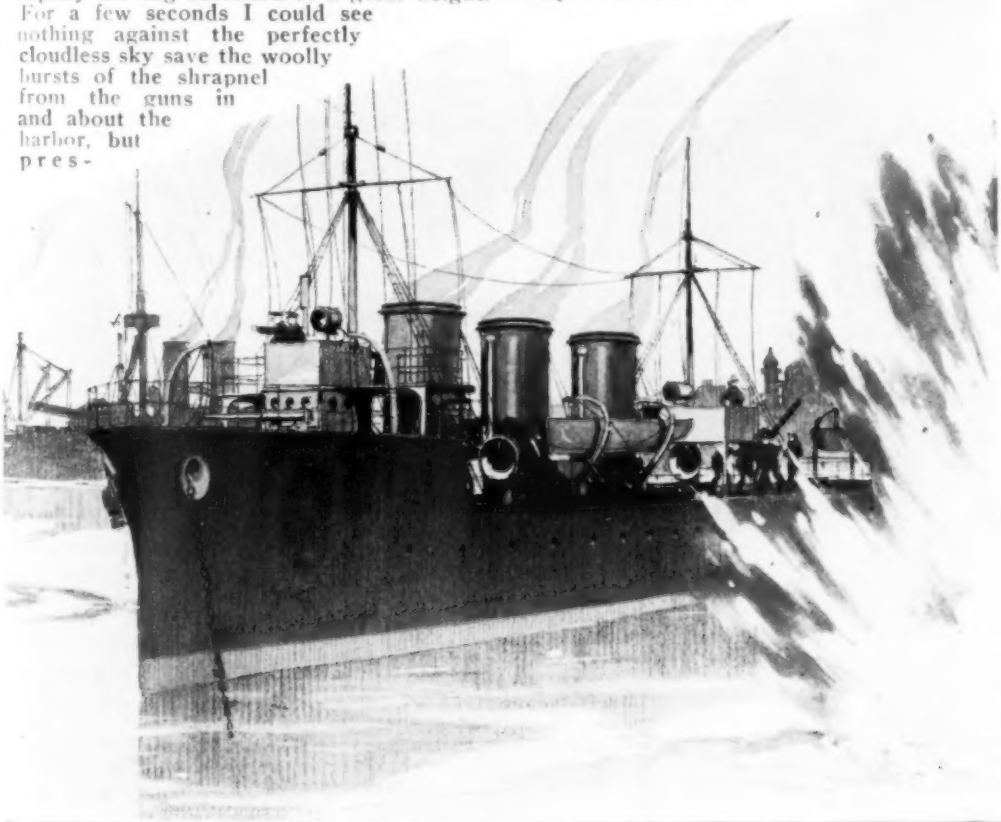
"Time enough to go up for a 'look-see' when the bombs begin to drop," said

"I had time no more than to notice that the blast—or possibly it was the waterspout on the wave following it—had from where the bomb fell at the 'psychological moment,' when there leapt up another foam geyser, and another.

the acting captain, stirring his coffee. "Not much chance of them coming out this way when they know the hospitals are all full up from last week's fighting on the Vardar. Just as a U-boat won't waste a torpedo on a warship if there is a chance of throwing it into a merchantman or passenger liner, so a Hun airman isn't likely to take a shot at us here when he has such a target as the hospitals offer him down on the point. Still, you can't always be quite sure about the Hun, though. Now I remember—"

The sharp bark of gunfire so near that it could only come from one of the battleships or cruisers in the harbor took the words out of his mouth, and I do not recall ever hearing the rest of the story. With a hurried "They must be coming this way after all," he pushed back from the table, seized his cap, and bolted for the ladder, the rest of us following in his wake. A couple of the destroyer's own high-angle guns came into action as I reached the deck. They were trained slightly shoreward at the moment, but with the next shot or two were pointing directly overhead. Then they went over a degree or two on the other side of the perpendicular, as though trying to range on a target that was rapidly moving eastward at a great height. For a few seconds I could see nothing against the perfectly cloudless sky save the woolly bursts of the shrapnel from the guns in and about the harbor, but presently, watching where these converged thickest, I was just able to discern two speeding blue-black shapes but imperfectly silhouetted against the purple dome of the heavens. Their height was very great—easily twelve to fourteen thousand feet—and they were sailing on apparently quite oblivious to the shrapnel, not a great deal of which was bursting at their level. The thing that impressed me most at this juncture was the fact that anything so large as I knew these bombing planes must be could be so hard to see in a perfectly clear sky, and I was just starting to remark on the phenomenon to some one standing near when the first bomb fell.

Thunder out of a clear sky could have been no more surprising than that first great detonation was. The aeroplanes had gone a good half mile or more after they had passed directly above us, and yet here was a bomb (which could not possibly have come from anywhere else) dropping into the sea, not approximately beneath them, not even between them and the destroyer on which I stood, but actually five or six hundred yards still farther astern of them, toward the shore from which they had come. Of



capsized or stove in a small Greek sloop which an unlucky fatality had brought to a point but forty or fifty yards and still another, each followed by an increasingly heavy jar and explosion. The last two 'straddled' us."

course, it was easy enough to figure how their great height and speed and the comparative slowness with which the bomb fell for the first mile of its drop, would conspire to produce exactly such a result. For the moment, nevertheless, the thing appeared absolutely fantastic.

I had time no more than to notice that the blast—or possibly it was the waterspout or the wave following it—had capsized or stove in a small Greek sloop which an unlucky fatality had brought to a point but forty or fifty yards from where the bomb fell at the "psychological moment," when there leapt up another foam geyser, and another, and still another, each followed by an increasingly heavy jar and explosion. The last two "straddled" us, the one striking about fifty yards to port and the other something like twice that distance to starboard. There was only an interval of a second or two between the explosions, and the slender craft was still ashiver from the jar of the first, when the counterjar from the second jolted into it from the other side. These jars communicated through the water impressed me as being a good deal sharper than those sent through the earth by explosions of equal force at similar distances. On the other hand, they did not appear to have anything like the "kick" in them as one on a ship feels from a depth charge dropped anywhere inside of a quarter of a mile.

The explosions came so quickly that I had no time to crystallize any definite impression in the matter of the force and direction of the air blasts. On land I had repeatedly noticed the vacuum caused by the upward force of the explosion of a bomb to which I have been fairly close, so that the air, for a brief instant, rushes inward along the earth to replace that which has ascended. Doubtless the same thing happened on this occasion, but, if so, the countercurrents from the explosion on the other side made such a mix-up that it was quite impossible to note anything definite. That the conflicting blasts from the two explosions of the "straddle" did develop a transient "cyclonic" condition of the atmosphere seems probable from the fact that I saw a number of caps, blown from the sailors' heads by one or the other of the explosions, drawn up for a few seconds into the air exactly as though caught in the vortex of a whirlwind. Indeed, though I did not see it actually happen, I was rather inclined to believe there was a good deal of truth in the statement of one of the gunners, who solemnly declared that his cap was blown overboard by one explosion and blown back again by the next. If the cap had fallen into the water the phenomenon could hardly have happened, but if it had only been sent spinning in the air by the explosion to port, it is readily conceivable how the one to starboard could have sent it spinning back again.

I am inclined to think that it was a fragment from the nearer of the two nearest bombs which slashed a jagged cut across the scalp of one of the watching seamen, a wound which was the sum total of our casualties. The fragment, which I saw later, was about three inches long by two inches wide and a quarter-inch thick. It was of a very fine quality of steel, which showed the same tendency to bend and tear rather than fracture, which I had remarked in examining the casing of bombs dropped by German air craft upon London. Its use is evidently the result of an attempt to increase the explosive carried to a maximum by reducing steel to a minimum.

Just as the last of the four bombs exploded, I became aware that a similar "train" was tearing its way across the harbor about three hundred yards to the seaward of the first, and roughly parallel to it. This last swath, starting well beyond the battleship (at which the first bomb may have been aimed), "straddled" a cruiser with a comfortable margin on either side, blew the sails clean away from (but without apparently inflicting other injury to) an old coastal schooner of some sort with a fourth bomb, and finished up with a fifth planted, as it looked to me, almost against the side of a destroyer belonging to the same flotilla as did that from which I watched. Half or more of the low gray craft disappeared behind a spout of water, foam, and smoke, but I distinctly saw the unobscured bridge and forecastle give a sharp lurch—half forward, half sideways—as it reeled beneath the impact of the mighty blow. So far as I could see, however, there was no especial lifting force exerted, and I am positive that I did not see any more of the hull below the water line than she would have exposed in riding a good stiff North Sea wave. I am very much inclined to believe that the expression "to blow a destroyer or patrol boat out of the water" (used so often in describing aerial attacks upon light craft) is very much of a figure of speech. So far as I have ever learned, the destroyer suffered no injury whatever from the explosion. The several casualties it suffered were due to flying bomb fragments.

What had happened was evidently this: The two German aeroplanes, attracted by the favorable target offered by the ships in the harbor, decided to spring a diversion by dropping their bombs there instead of upon the hospitals, camps, stations, and other objectives upon the land, as they had been doing in the past. On account of the great height at which they were flying, it is probable that no particular ship was aimed at, but that lines were taken running across the battleship and one of the cruisers, and the bombs released so as to fall along these in the hope of striking one of a number of targets. If any one ship had been aimed at, the bombs would have come down in a fairly closely bunched salvo, instead of one after another in quick succes-

"'He came nosing down to about 2,000 feet before deciding that the canvas-covered hammock abaft the after funnel looked too suspicious to take any chances. We snaked the canvas off and started pumping at him just as he flirted out a bomb and began to spiral up.'"

sion as they did. From the interval separating them on striking, it is probable that each bomb was released by itself, but just about as fast as a finger tip could move from one press-button to the next. There is no question but what this was the procedure most likely to yield "results" under the circumstances, but that even so it was a forty to fifty-to-one chance against a direct hit.

There is no reason why, if he can get his eye on it in time, a man cannot see a bomb falling from an aeroplane at a height of two miles or more, and the fact that I did not mark the flight of any in this instance was probably due to the fact that there were so many other things to distract the attention during the few seconds the show lasted. It was for the same reason that I have no recollection of hearing the "swish" that must have heralded the approach of the two bombs which "straddled" the destroyer I was on, where, a few seconds later, the premonitory shriek of the more distantly falling bombs from the other machine left a distinct impression on my mind. Plainly, the latter was in a more "detached" state in the second instance.

Getting and keeping one's eye on a bomb that is falling from an aeroplane is a good deal a matter of "knack" and experience. On a clear day the man who releases a bomb of any size has little difficulty in following it all the way to the earth, if he has any interest in doing so. This is because he is directly ahead of the bomb's line of flight. A man on the earth who is anywhere near a low-flying machine has little trouble in following the flight of one of its bombs, for the simple reason that the latter have not room to get up any great speed. If the machine is a mile or more in the air, however, the best way for him to get a line on a bomb is to pick it up with a glass while it is still falling slowly just after its release, and then hang on to it all the way down. If he waits till it begins to cross his line of vision as it nears the earth, the chances are that the only thing he will see is a dull-gray blur that merges into the flash of the explosion. Of course, the ideal bomb for a man to see would be the one that is going to strike squarely on top of his head, for in that case he exchanges places—in reverse—with the bomber, and observes the missile approaching down its own line of flight. I have never had the fortune to talk with anyone who had studied the fall of a bomb from this ideal vantage, but it is easy to imagine that there would be other factors operating calculated to make it difficult for one to concentrate attention on the object itself.

The foregoing incident fairly illustrates about all there usually is to an air-craft attack upon warships of any class in harbor. The latter simply do the best they can with their anti-aircraft guns, aided by any land guns that can be brought to bear, and sit tight till the raid is over. As the guns at least serve the purpose of keeping the raiders at a considerable height, hits by bombs are largely the result of chance, and, as such, are very rare. With the ships at sea, with plenty of room, this chance is reduced to an almost negligible minimum.

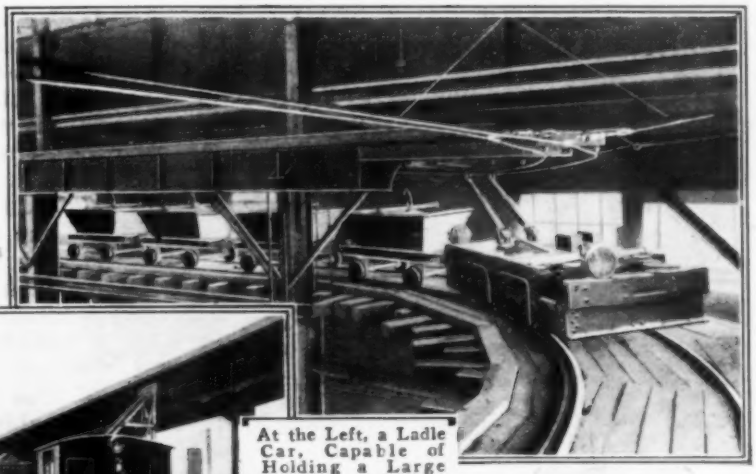
A young destroyer captain with whom I was talking a few days ago had had a number of encounters with German seaplanes during the year he had been working off the Belgian coast from one of the southern bases. "At first," he said, "I was rather afraid of the seaplanes and didn't take any more chances with them than was necessary to carry out whatever job I happened to be on. I tried to hold them off as far as I could with my high-angle guns, and got on out of the way just as soon as there was nothing in the duty line to keep me. But as soon as I began to find out by experience that I could wriggle away from under a bomb (which would otherwise have been a direct hit) while it was dropping from anywhere above half a mile or so, the contempt of familiarity began to grow very fast. Then I started to try and lure them lower by covering up my high-angle guns and making out that I had nothing to have a go at them with. This worked fairly well for a while, and I got some very lively practice out of it. One fellow, at least, I know that I did for.

"He came nosing down to about 2,000 feet before deciding that the canvas-covered hammock abaft the after funnel looked too suspicious to take any chances. We snaked the canvas off and started pumping at him just as he flirted out a bomb and began to spiral up to thinner air. Our respective contributions must have crossed in flight, for our shrapnel blossoms burst into flower at almost the same moment his bomb tossed up the water fifty yards to one side and a hundred yards astern. It was almost our first shell that winged him —not more than a plane tip or strut, I think, but still enough to destroy his balance—and he made a wobbly attempt to plane in toward the land. He struck the water with a heavy splash well inside of a mile, but still at a point where I knew it was too risky for me to venture on account of mines. I had no choice but to leave him there, and would have steamed away and allowed him to await a rescue in peace if he had only been content to accept the situation and make a decent pretense of lying 'doggo.' Hardly had we put about, however, than he began to tinker with his engine, and before there was more than a mile and a half of distance between us I saw the churn of his wake as he began floundering seaward through the water. His action left me only one thing to do and I did it. Turning eight points, I gave him a broadside, and when the foam spouts tossed up by the shot settled down, there was nothing left floating behind them.

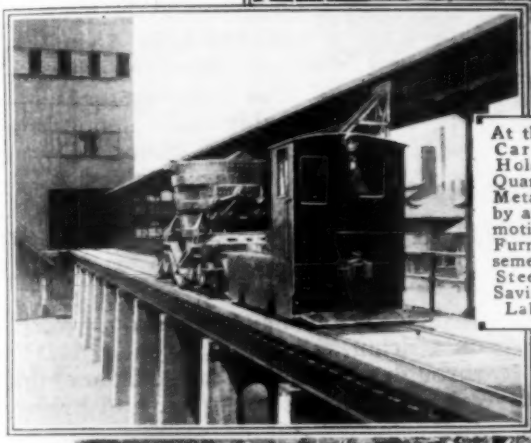
"The Huns became wary as soon as a few of them got burnt by venturing down too close, and I began to cast about for something new. Nothing was of much avail, however, until one day, in a sheer fit of pique because a seaplane which had plainly been sent out to bomb us, insisted on doing his stalking behind some floating banks of cirro cumuli which couldn't possibly have been lower than 10,000 feet, I descended to the street-gamin tactics of calling names. The International Morse is as well known to the Hun as it is to us, and when I spelled out 'Swinehund!' to him by searchlight flash, it seemed to make him mad clean through. Without waiting to call me anything in return, he came tumbling down in a googly spiral and kicked out all the 'eggs' he had at not over 800 yards. The very suddenness of his action saved him, for we were not anticipating a stunt quite of that kind and didn't react to it quickly. Our shooting was wild for the first half minute or so, and, with the devil's own luck, his was almost perfect. That salvo of bombs plumped down all the way round my little craft like the knives the bowie thrower pins his lady assistant to the board with without pinking her. Luckily, we got off quite as well as the lady, for not a one of the several fragments which came aboard injured much of anything but paint. Our fire had him reeling for the first minute or two of his retreat, but he soon got out of range with his machine apparently less damaged than his temper. Then—for all the world like an urchin poking his head over a fence and making faces at another he is afraid to come out and fight—he teetered along the edge of a cloud and flashed back at me. It must have all been very low German indeed, for I was never able to make anything out of it.

"Naturally, as this first attempt had brought a rise—or rather a dive—so promptly, I hastened to develop the idea so happily chanced upon. Unfortunately, as my German was limited, I did not have much latitude of expression. A skulking pilot whom I greeted with *'Mein Liebchen, was willst du mit mir?'* simply became suspicious and made off without venturing any nearer, and various terms of endearment usually had a similar effect. I didn't have the words to rub it in about the 'Lusitania' and the Belgian atrocities, but when I ventured into the martyr list and flashed to a diffident pilot, *'Was* about Captain Fryatt?' and *'Was* about Edith Cavell?' he just about wiped me off the face of the sea with *'Was ist los mit* Roger Casement?' That was the last time I tried the 'martyr' bait. All in all I found that 'Swinehund!' seemed to hurt their feelings more than any other German abuse at my command."

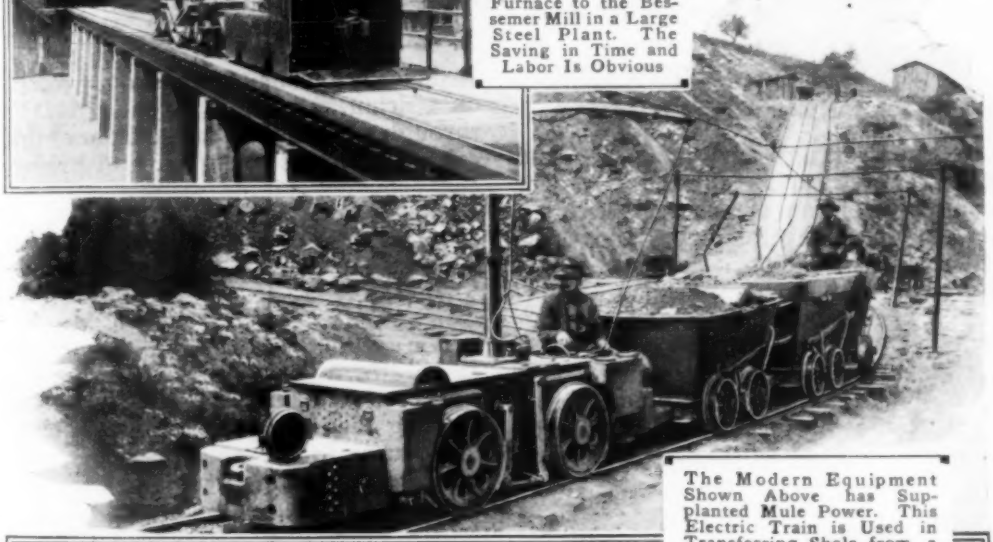
ELECTRIC TRACTORS SAVE LABOR IN MANY PLANTS



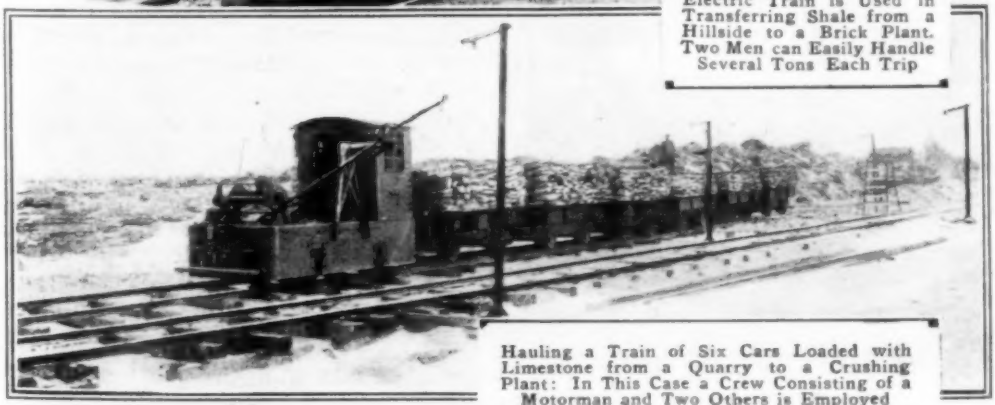
Two-Trolley Locomotive on Elevated Structure in a Glass Plant, Carrying Batches of Material from a Mixer: Note That This Outfit is being Operated without a Motorman, It being Controlled from a Switchboard So Situated That the Train can Always be Kept in View



At the Left, a Ladle Car, Capable of Holding a Large Quantity of Molten Metal, is being Drawn by an Electric Locomotive from a Blast Furnace to the Bessemer Mill in a Large Steel Plant. The Saving in Time and Labor Is Obvious



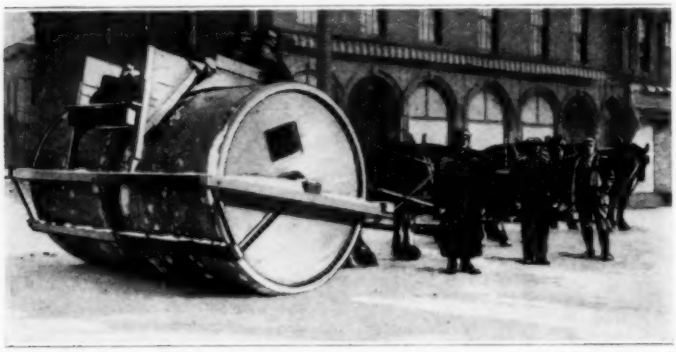
The Modern Equipment Shown Above has Supplanted Mule Power. This Electric Train is Used in Transferring Shale from a Hillside to a Brick Plant. Two Men can Easily Handle Several Tons Each Trip



Hauling a Train of Six Cars Loaded with Limestone from a Quarry to a Crushing Plant: In This Case a Crew Consisting of a Motorman and Two Others is Employed

HEAVY ROLLERS PACK SNOW AND KEEP ROADS OPEN

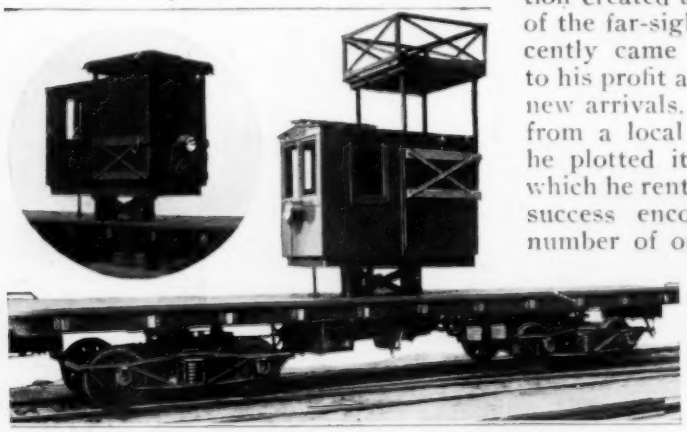
Large rollers, weighing about 3,500 pounds, and drawn by six or more horses, were effectively used last winter in keeping snow-covered town streets and country roads open to traffic in the New Hampshire hills. At Laconia four such contrivances were employed with splendid success. After a heavy storm, the sidewalks were cleared, and the snow in the streets leveled with scrapers mounted on runners. Then the mass was packed solidly by passing rollers over it. In this way roadbeds capable of supporting heavy motor trucks were maintained without difficulty, in some places passing over deep drifts.



By Employing the Rollers, Firm Roads for Heavy Motor Trucks were Maintained in Some Places atop Drifts from Six to Eight Feet in Height

LINE-CONSTRUCTION CAR HAS NEW FEATURES

A particularly serviceable line and construction car in use by a power company consists of a flat car having a cab mounted several inches above the floor, on iron supports under the center of the cab—an arrangement providing a maximum of space for carrying rails, poles, etc. On the cab roof is an elevating tower for linemen, with a railing that can be folded down against the platform when the tower is lowered. The raising and lowering is done by means of wire rope wound on a drum, controlled by the operator through a handwheel at the front of the cab. A gong, headlights, and brakes are provided as for ordinary trolley cars.



Line and Construction Car with Cab Mounted to Give Maximum Loading Space: Insert Shows Tower Collapsed

WORKER SUPPLIES HOUSES FOR SHIPBUILDERS

The revival of shipbuilding in a Maine town has brought so many workers to that locality that ordinary housing facilities have proved utterly inadequate to the need. This condition created an opportunity which one of the far-sighted day laborers who recently came to the city has utilized to his profit and for the benefit of many new arrivals. Securing a tract of land from a local transportation company, he plotted it and erected tents on it which he rented at nominal prices. His success encouraged him to build a number of one-room, and later three-room, houses, supplied with electricity and city water. These are sold for cash or on the installment plan and are in great demand. They are clapboarded and sheathed inside,

and in place of furnaces or stoves are heated with electricity, as a safeguard against fire. The new district already boasts of two small parks.

"SKYSCRAPERS OF HAYFIELD" CONSERVE VALUED CROP

"Skyscrapers of the hayfield" have sprung up in parts of the West as a result of war-time precautions to preserve the valued hay crop against damage during the rainy season. These tall structures are composed of bales of hay piled high, one on the other, and topped by a gabled roof of rough boards. This storage plan is preferred to spreading the bales over more ground, for in that case more roofing

Baled Hay Piled High beneath Wood Roof to Protect It against Winter Rains: Low Broad Piles are Not So Much in Favor Because They Require More Roof

would be required, involving heavy additional expense on account of high lumber prices.

HOMEMADE MOTORCYCLE CHEAP TO OPERATE

With a few bicycle parts, a long frame made of piping, and a 1-hp. air-cooled gasoline engine, a mechanic has constructed a motorcycle which makes as much as 50 miles on a gallon of gasoline, it is claimed. Very little lubricating oil is needed and the tires for the 28-in. bicycle wheels are not expensive to replace. The machine has a speed of 23 miles per hour and is a good hill climber. The cost of the ma-

A Homemade Motorcycle Which Has a Speed of 23 Miles an Hour and will Travel an Average of 50 Miles on a Gallon of Gasoline

terials used, aside from the engine, was only $20. The engine transmits power through a leather belt, made taut by a pedal, to a countershaft which in turn drives the back wheel by means of a roller chain.

SIX-FOOT POWER BOAT DRAWS CANOEISTS

A 6-ft. power boat that is a decided novelty has been constructed by two sportsmen and is used by them to tow their rowboat or canoe, thereby making rowing or paddling unnecessary. The shapely little craft has a 13-in. beam and is equipped with a ¼-hp. gasoline engine which drives a three-blade propeller, 5 in. in diameter. The boat weighs 75 lb. Ordinarily it is attached alongside the larger boat so as

Loaded Canoe with a Power Boat, Six Feet Long, Fastened beside It, Which Pulls the Larger Craft

to bring its controlling devices within easy reach. To keep a straight course the rudder is set at a slight angle.

STAMP PURCHASERS "NAIL" EFFIGY OF KAISER

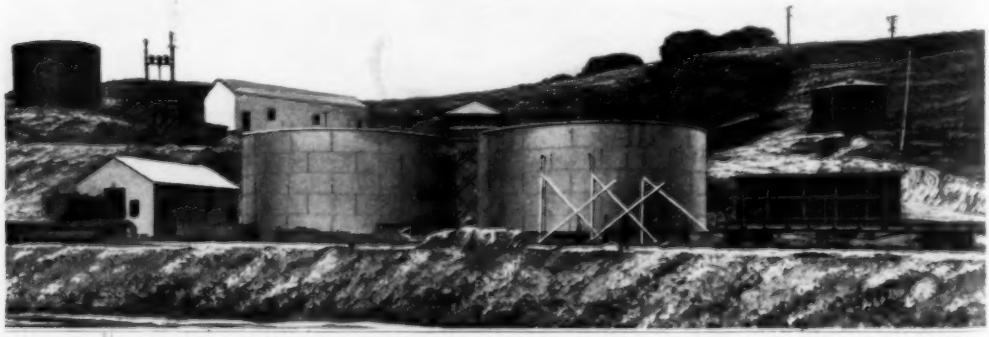
"Nail the Kaiser! A Thrift Stamp will Do It." was the inscription placed at the foot of a wooden effigy of the German war lord, displayed in the doorway of a Honolulu hardware store on thrift-stamp day. At the close of business, $900 worth of stamps had been sold, and the purchasers had driven over 700 nails into the figure. Later the effigy was dragged through the streets, shot by a real firing squad, and publicly burned, a body of Boy Scouts assisting in the demonstration.

TANKS CLEANED AT A COST FAR BELOW ESTIMATE

When it was decided to utilize two oil tanks, 54 ft. in diameter and 25 ft. high, as reservoirs for edible coconut oil, contractors estimated that it would cost $750 to clean them thoroughly, part of that sum being for the erection of scaffolds for the cleaners, inside the tanks. The time required to complete the job was estimated at three weeks. Through the ingenuity of a man interested, however, the cleaning was done by four men in four days at a cost of only $48. In place of a scaffold the tanks were filled with sea water and large rafts were placed inside, on which the men stood when cleaning the walls. As the work progressed the water was drawn off, gradually lowering the rafts. It was found, too, that the salt water softened the scale on the sides of the tanks, making the work easier than had been anticipated

FLASH-LIGHT SIGNAL WORN ON BACK OF HAND

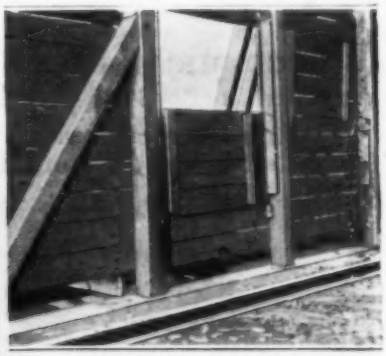
A new form of flash light, having interest for military men and others, consists of a signaling device which attaches to the back of the hand by means of a strap or fingerless glove. The batteries are contained in a shallow metal case, in the top of which is the lens, while the switch button is located in the palm of the hand and can be easily operated by one finger, either to flash signals or to light one's way.



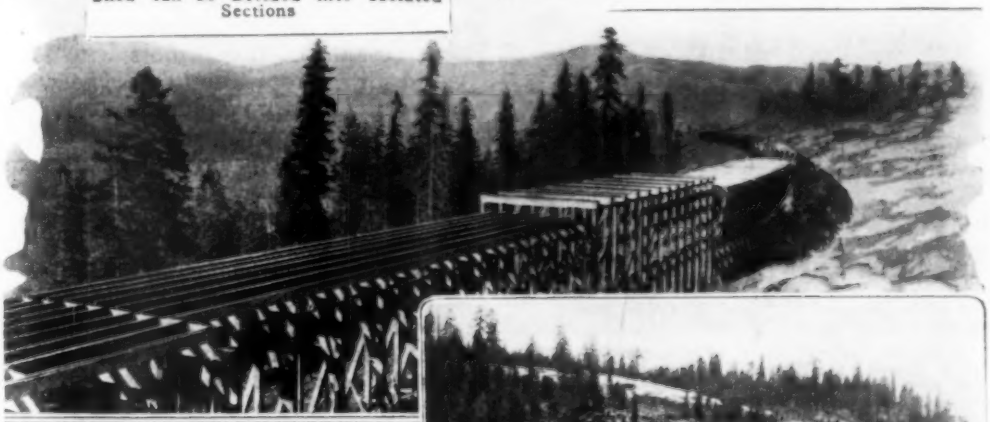
Whereas Bidders Estimated That It would Cost $750 to Clean These Oil Tanks Preparatory to Storing Coconut Oil in Them, the Work was Actually Done for $48 by Placing the Workmen on Rafts Instead of Scaffolds

RAILWAY SNOWSHEDS HAVE TELESCOPING UNITS

Telescoping Section of a New Type of Snowshed Partly Nested in the Adjoining Structure: By This Means a Long Shed can be Divided into Isolated Sections



One of the Sliding Shutters in the Side of the Shed is Here Shown Opened. These are Located on a Level with the Car Windows So That Passengers can View the Scenery



A View of One of the Long Sheds in the Course of Construction, Which Gives a Clear Idea of the Large Amount of Material Required: The Section in the Foreground is Designed to Telescope into the One Beyond

At the Right, the Transverse Smoke Vents, Now Preferred to Longitudinal Ones, Are Shown

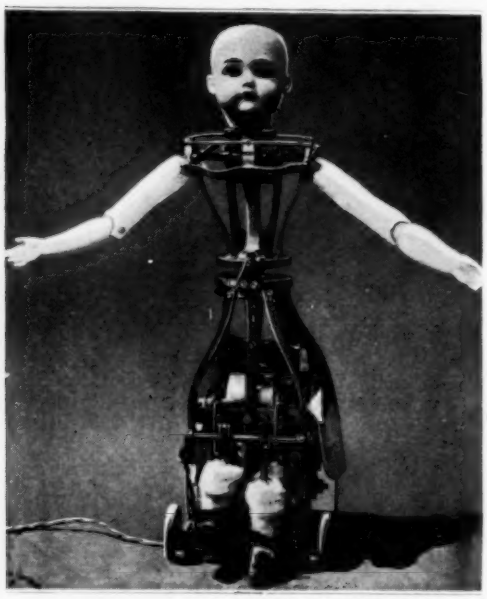
Several important improvements have been introduced by the Southern Pacific Railroad in the design of its snowsheds, which cover 30 miles of track running through the Sierra Nevada Mountains. One of these consists of telescoping units having a maximum length of 96 ft., which make it possible to divide long sheds into isolated sections as a means of protection against the spread of fire, or for other purposes. Each unit is made with removable outside braces and is mounted on rails, so that a locomotive can draw it into the adjoining structure, purposely made larger to receive it.

The sheds have also been provided with sliding shutters, placed on a level with the car windows and, when lowered, affording the passengers a view of the landscape. Smoke vents extending transversely across the top have been found more effective than those extending longitudinally. "Combing boards," or uprights, nailed to the sides of the sheds and extending high

in the air, prevent the formation of overhanging drifts of snow that sometimes severely rack the structure.

MECHANICAL DOLLS AID AIRMEN'S BENEFIT

Two intricately constructed mechanical dolls that can perform astonishing feats have recently been placed on exhibition to raise funds with which to purchase athletic equipment for overseas air squadrons. The figures are mounted on small wheels and are equipped with motors. They can give a very good imitation of walking and dancing, and can bow, move their arms, and talk, all in a very lifelike manner.



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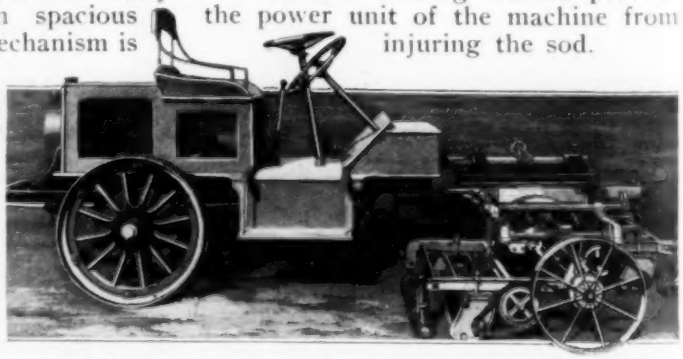
View Showing the Works of a Remarkable Mechanical Doll Which can Imitate Dancing and Walking and can Perform Many Other Feats in a Lifelike Manner

MAY MAKE NEW WATERWAY IN SOFT-COAL REGION

The serious shortage of rolling stock and the consequent congestion of the railways have revived agitation for canalizing the Big Muddy River, one of the large streams in southern Illinois which drains important soft-coal fields and empties into the Mississippi. A recent session of the Illinois legislature voted an appropriation of $900,000 for this public improvement, but it was vetoed by the governor on grounds of war-time economy. Now, however, industrial interests in St. Louis and in towns along the river are pointing out that coal could be carried on this stream 10 months in the year if it were canalized and that it could be shipped to St. Louis at a cost of 15 cents a ton, as against 57 cents a ton, plus 20 cents bridge charge, for coal sent from within a 100-mile zone.

MOTOR LAWN MOWER CUTS SEVEN-FOOT SWATH

A motor-driven lawn mower which cuts a swath 87 in. wide has recently been built for use on spacious grounds. The cutting mechanism is divided into three units, each similar in principle to an ordinary mower and so constructed that it adjusts itself to unevenness in the ground independent of the other units. The driver occupies a seat above a two-wheel power unit which is located behind the mower proper and can be detached from it for use in other ways, if desired. Broad tires on the driving wheels prevent the power unit of the machine from injuring the sod.



Motor-Driven Lawn Mower, the Cutting Mechanism of Which is Divided into Three Units, Each Built Somewhat Like an Ordinary Mower: The Total Swath Cut Is 87 Inches Wide

PRODUCING MATERIALIZED FORMS IN MEDIUMISTIC SEANCES

A SPIRITUALISTIC cabinet medium who received from $20 to $50 per seance, a few years ago, performing in eastern cities, was last heard from gathering dollars from the easy marks in the West. The following was one of her manifestations, when conditions were poor. The performance is explained by the person who sat in front of the cabinet, and is given to the public to save the dollars of those who might otherwise purchase seance tickets with the idea of investigating real spiritualistic phenomena.

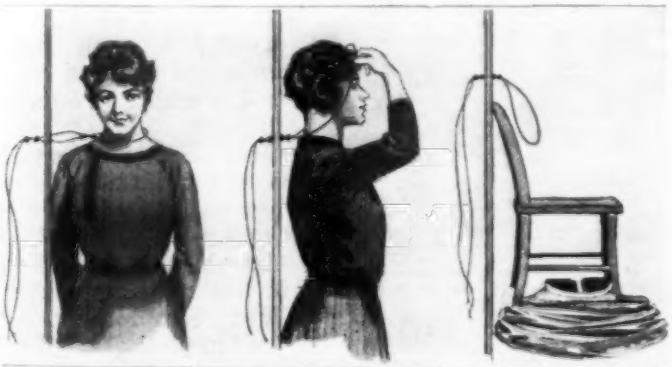
The cabinet used by the medium has three sides of wood, the front being open. All is covered with black cloth and a black curtain closes the front; the curtain is slit in the center, also pulls from the side where the medium sits, so the audience can see how she is prepared before the seance. A chair is placed inside the cabinet, the back against the left side. Over the back of the chair at the height of the neck of the medium, two small holes about an inch apart are bored to receive the cord used in the performance.

The curtain is drawn to the right side of the open front of the cabinet, and a committee from the sitters examine the cabinet. The medium then sits in the chair facing the sitters. The committee then tack the bottom of the medium's skirt to the floor, pass the center of the cord around her neck, tie two knots close to the neck, and then pass the ends through the holes in the side of the cabinet. On the outside of the cabinet two more knots are tied and the free ends of the cord passed to a person in the audience, who holds them during the performance, or seance.

Medium Seated in the Cabinet with Her Skirt Nailed to the Floor, and a Cord, Held by a Person in the Audience, Looped about Her Neck

During the securing of the medium with the cord, the medium leans the head toward the side of the cabinet as though entering a trance, which apparently shortens the distance between the neck and the cabinet, but the distance remains the same.

The curtain is now drawn across the front of the cabinet and the room darkened, except one very dim burner. To the amazement of the audience, after a little speech by the control, phantom lights are seen in front of the curtain, and through the central opening in the curtain the white material of a materialized form



Left-Hand View Shows the Captive Medium as the Audience Sees Her. When the Curtain is Drawn in Front of Her, She Turns and Slips Off the Noose, as Shown in the Center View, and Then, Loosening Her Skirt at the Waistband, Leaves It beside Her Chair

is seen as the curtains each side of the opening are waved back and forth. Then, to cap the climax, out walks a full form of a woman and the seance begins. After the usual proceedings of whispered messages and changes in the form as it moves back and forth in and out of the cabinet, the lights are turned up, the curtain drawn from the side of the cabinet, and there sits the medium "returning from her trance."

The secret is this: As soon as the curtain is drawn, closing the front of the cabinet, the medium unfastens the waistband of her skirt and lowers it to the floor. She then turns her back to the side of the cabinet and loosens the knots; then slipping to the side of the cabinet, passes the loop over the head, and is prepared for the seance.

Phosphorescent cardboard, cut in different shapes and secured to wires, is used by the medium to produce the apparently floating lights in front of and beyond the cabinet. The white garment worn by the medium in the seance is worn under her dress and is available when the skirt nailed to the floor is lowered.

After the seance, the medium returns to the sitting position in the chair, after raising and adjusting the nailed skirt. Her head is placed in the loop, the knots passed back to their first position near the neck, and after assuming the entranced position, signals for the curtain to be drawn.

RAWHIDE BRIDGE CROSSES SWIFT INDIAN RIVER

Natives of Kashmir, which is in the northern part of British India, cross the Srinagar River at one point by a suspension bridge of extremely simple, not to say inexpensive, construction. The "structure" consists of a rope, that serves as a foot "path," connected at intervals with two others that are used as hand "rails."

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In the Interest of Safety, Traffic across This Bridge during the "Rush Hours" Proceeds in One Direction at a Time

TWO-INCH CONCRETE WALLS CARRY WEIGHT OF HOUSE

In connection with the work being done to better housing conditions in some of the industrial centers, government attention has been directed to an interesting type of cement-stucco house lately developed. The outer walls, instead of being merely covered with a veneer, are about two inches in thickness and heavily reinforced with half-inch rods placed vertically and horizontally to form 16-in. squares. Over this a metal screen is attached before the concrete is applied, first to one side and then to the other, instead of being poured. When completed, these walls carry the weight of the building. The inner ones are constructed of light studding, lath, and plaster. This arrangement gives the needed air spaces and provides a warm, dry house of apparently durable construction at moderate cost.

GERMANS OPERATE ENGINE ON HEATED TAR

The use of tar instead of tar oil as fuel for a Diesel engine in a German municipal plant is one of the means resorted to by the enemy to meet the shortage of regular fuels, according to reports. The tar is heated to about 95° and then passes under pressure through a filter composed of a bed of gravel 16 in. thick. As it flows from the filter down to the engine, exhaust gases from the latter heat it to about 175°, and on entering the cylinders it undergoes complete combustion. The filter requires cleaning about once a month.

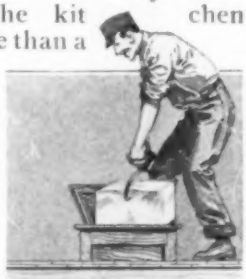
FUEL-SAVING FIRE POT HAS SLOTTED BACK

A marked reduction in the amount of coal consumed results, it is claimed, from the use of a special make of stove, or furnace, having a firepot in which the air is fed into the burning coals through vertical slots in the sides. In the case of a kitchen range, these slots are at the back, and the air, entering the front of the stove, is drawn down under the pot and into vertical flues behind it. Slots in the sides of the flues admit the air at the back side of the fire, causing the soot and gases that ordinarily escape to be consumed, and nearly doubling the heating value of soft coal. A range is also made in which a fire pot of this type and gas burners are combined.

¶ A tremendous subscription to the fourth Liberty loan will be as distressing to the German people as a defeat for them on the battle field, and it will mean as much. It spells their defeat; it breaks their morale; it means power to their enemies. A subscription to the loan is a contribution to German defeat and American victory.

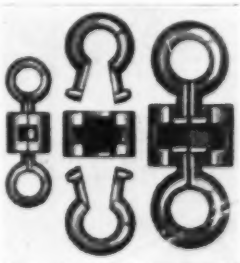
COMBINATION DUMB-WAITER AND ICE BOX SAVES ICE

A dumb-waiter and ice box, combined, is a new household utility which saves space in the kitchen and requires less ice than a refrigerator permanently located on the first floor. It is moved up and down, with the aid of counterweights, in vertical ways that project down into the basement from an opening in the kitchen floor. The top of the refrigerator normally comes even with the floor, and the replenishing of the ice supply, which is done through the top, necessitates little lifting.



CHAINS QUICKLY MENDED WITH SWIVEL LINK

A combined swivel and chain-repair link for mending chains quickly, consists of two eyes, each with a split shank, spread apart so that they can be attached to the broken ends of the chain, after which the halves of each shank are forced together. The two eyes are then united by inserting the split members into either end of a cylindrical clamp that closes tightly about them and from which they cannot be withdrawn because of a lip around the opening at either end of the clamp and a flange on the ends of the shanks.



INTRUDER SLAIN AT "SOO" PROVES TO BE A BEAR

The good marksmanship of a soldier guarding the "Soo" Canal locks at night recently enabled him effectively to

Soldier on Guard at the "Soo" Locks in Upper Michigan and the Intruder Which He Shot When a Challenge Brought No Response from the Form That could be Dimly Seen Moving toward the Canal

stop an intruder, though the trespasser who was felled was not an enemy prowler, such as the guard feared was endeavoring to damage this highly important link in the Great Lakes waterway. The night in question was very dark and the attention of the man on duty was attracted by the dim outline of a moving object which refused to respond to a challenge. Deciding to take no chances, the soldier fired. It was found that the shot felled a young bear, weighing 200 lb., which had wandered into the guarded zone.

BAGS OF SEAWEED PROTECT VENETIAN ART RELICS

Because Venice has no solid foundations, peculiar difficulties have been met with in providing effective covering for the art treasures in that city. It is practically impossible to erect masonry defenses as has been done in other northern Italian cities, and even sandbags are too heavy in many instances. Under these circumstances mattresses filled with seaweed have been resorted to and have proved surprisingly effective in preventing damage from explosions. They offer resistance to flying particles, are light, elastic, and almost incombustible. The authorities in Venice have also learned that an ordinary curtain hung over mosaics and stained glass is a real protection against the concussion of explosions.

SILENT CURFEW "BLINKED" NIGHTLY IN SEATTLE

The long-established custom of sounding the curfew has been modernized in Seattle, Wash., and a bell is no longer rung. Instead, a warning to

Electrician in Seattle Light Station Pressing a Button That Causes the Street Lights to "Blink"—a Signal Announcing That the Curfew Hour has Struck

the youths that the hour of 10 has arrived is given electrically. At the proper time each night an electrician

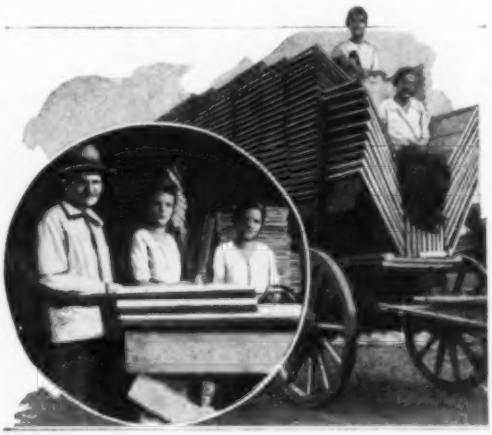
in the city light station steps to the big switchboard and quickly presses 12 buttons, causing the street lights all over the city to "blink" and in that way informing the boys and girls that it is time for them to be indoors.

TEN THOUSAND AUTOISTS OFFER CARS TO ARMY

If at any time the government should desire quickly to transfer a body of troops from one of the Texas camps to some other point, 10,000 automobile owners stand ready with their cars to aid in the task. The only condition attached to this patriotic offer by these motorists, all of whom live on one of the principal highways of the Southwest, is that the transfer be made in relays of 25 to 50 miles.

YOUNG GIRLS MAKE CRATES FOR WAR SHIPMENTS

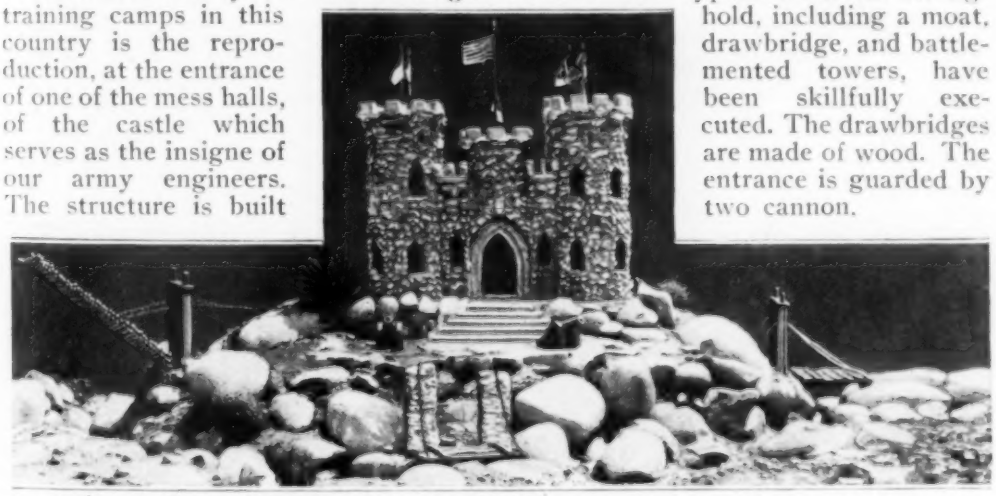
The making of knockdown crates and cases, in which army supplies are shipped to France, is a war-time task in which two girls still in their teens are proving very efficient. Their equipment is unusual in that the buzz saw employed is driven by an automobile jacked up beside it. Not only do they, with the help of a man, cut the lumber into proper lengths, but they make the crate parts and pile them into the wagon for delivery. The output of these young workers is about 500 cases per day. They are as skillful in working with hammer and nails as in cutting the boards.



A Load of Knockdown Crates, Part of a Day's Output of Two Young Girls: The Insert Shows Them Cutting the Lumber for the Crates

ARMY ENGINEERS' INSIGNE REPRODUCED IN STONE

A particularly pleasing feature of a scheme to beautify one of the large training camps in this country is the reproduction, at the entrance of one of the mess halls, of the castle which serves as the insigne of our army engineers. The structure is built of pebbles and concrete, and the various features of a typical medieval stronghold, including a moat, drawbridge, and battlemented towers, have been skillfully executed. The drawbridges are made of wood. The entrance is guarded by two cannon.



Reproduction of the Army Engineers' Insigne Which Beautifies the Grounds of One of the Training Camps: The Castle Is of Pebbles and Concrete, and the Drawbridges Are of Wood

NEW SEPARATION PROCESS DEVELOPS GREAT ARIZONA COPPER DISTRICT

Electrolytic Treatment and Acid Leaching, on a Gigantic Scale, of Low-Grade Ores Dug Out of Neighboring Hills by Steam Shovels Follows Erection of a $6,000,000 Plant in the Desert, with an Annual Production of 50,000,000 Pounds

By STANLEY W. TODD

A GROUP of mining men in Arizona have been experimenting with low-grade ores found in a certain district in the southern part of that state. Five years ago, they began testing the earth which was dug out of the hills in the vicinity of what is now the town of Ajo, some 175 miles west of Tucson. As a result of their findings, it was decided to erect a 5,000-ton leaching plant right in the heart of the desert, and to provide everything that would be necessary for it. This plant was completed during the latter part of last year, at a cost of $6,000,000, and now it is producing copper at the rate of 50,000,000 lb. a year.

The new Arizona project is the only plant of its kind in the United States. The ore is dug out by steam shovels. This obviates the need of going under the surface by shaft methods, like those used elsewhere, where the ore is mined sometimes as far down as 3,500 ft. The ore in the New Cornelia district is chiefly low-grade; that is, it averages only about 1.51 per cent copper. Heretofore treatment of such ore had not been considered profitable.

What is said to have been the largest blast ever set off in the United States took place on this property. Some 50,000 lb. of powder were used and 225,000 tons of rock were broken up. In a similar way, but on a far smaller scale, the ore is broken up for transportation to the rock crushers. The oxidized ore thus obtained is conveyed on a standard-gauge railway to a coarse crushing plant, where a gy-

Mining Copper Ore with a Steam Shovel in the Ajo-Gila Bend District, in Arizona: A Great Plant, the Only One of Its Kind in This Country, Recently Erected in This Vicinity, Makes It Possible to Handle This Low-Grade Ore Profitably

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General View of the Refining Room in the Big Copper Plant at Ajo, Arizona, Showing the Numerous Tanks Containing Acid, in Which a Deposit of Copper is Obtained by Electrolysis: The Two Men at the Left are Examining the Sheets of Pure Copper on the Electrodes Lifted from the Tanks by the Crane Shown Above

ratory crusher, large enough to take any pieces of ore that will pass through the scoop of the shovel, cracks the

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Removing Thin Sheets of Pure Copper from One of the Plates on Which It has been Deposited

material to 10-in. cubes. From there, the ore passes direct to four gyratory crushers, which bring it down to cubes 3 in. in size. The granulated ore is then deposited in storage bins to be used as required.

Just before it is to be put through the leaching process the ore is automatically carried from the storage bins to a fine crushing plant, where it is smashed into gravel. In this form it is carried to the various leaching tanks by means of a traveling conveyor.

There are two sections of eight tanks each, each of which is 88 ft. square and 15 ft. deep and has a capacity of 5,000 tons. A movable bridge facilitates the spreading of the ore in the tanks, whereupon a weak solution of sulphuric acid is pumped in. This extracts about 80 per cent of the metal in the ore, which is carried off in solution, and after the leaching has continued for eight days, is pumped into closed electrolytic plants near by.

The tailings left in the tanks after the copper solution has been pumped out are removed by a large excavator, of 11 tons' capacity. This excavator operates by moving forward and backward, upward and downward, and sideways. There is a rotary motion to the dipper, which enables it to pick up tailings at any angle. Three "clamshell-fuls" of tailings fill each dump car, of which there are 10 to a train. Two trains are used to dump 5,000 tons in one night's time. The leachings are then carried off to waste dumps.

The spreader bridge and the excavator bridge are both of a movable type. The spreader can be set so as to move forward at about 7 ft. per hour, while the cross spreader moves backward and forward at about 15 or 20 ft. a minute. Upon rails on the outside bases of these tanks, the bridges travel back and forth along the full length of the tanks. At the ends of each set is a transfer track, by which the excavator or spreader bridge may be transferred over from one set of tanks to the other.

When the copper solution reaches the electrolytic tanks, it is kept in circulation through the tanks, and in the

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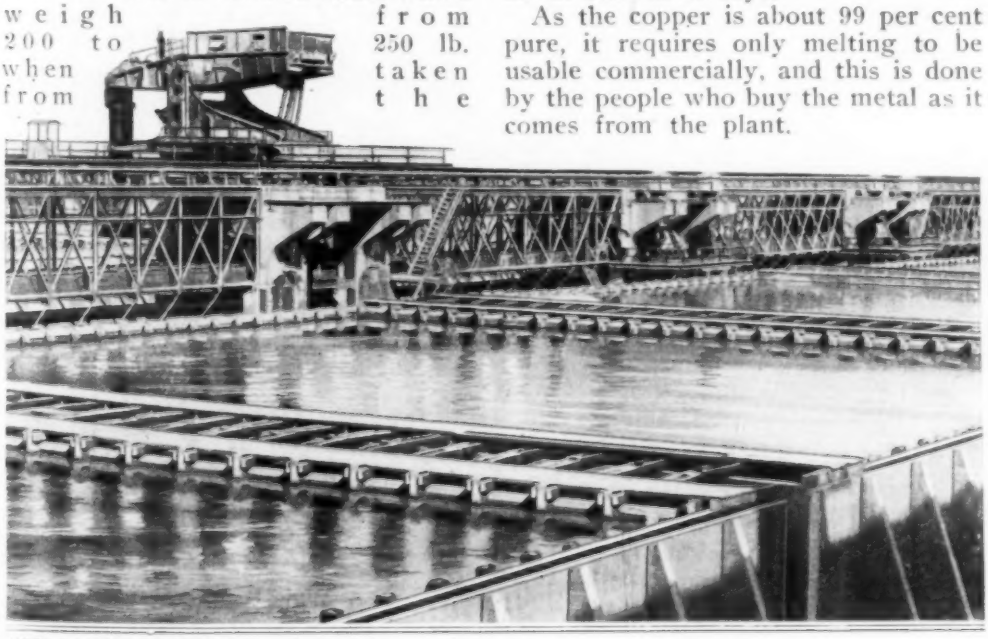
A Group of the Heavy Electrodes Lifted from One of the Tanks Preparatory to Stripping Them of Copper

Railroad Cars Switched onto This Track Receive Tailings from the Excavator, Which Moves above the Tanks on an Immense Traveling Structure. The Pipes Entering the Structure at the Right Carry the Solution to the Electrolytic Tanks

meantime the copper is deposited from the solution onto the cathode plates. The current passes from the lead plates in the tanks to the thin cathodes which weigh from 200 to 250 lb. when taken from the tanks. This process in the plant covers a 16-day cycle. In other words, the solution gets clear around the tanks about once in 16 days.

As the copper is about 99 per cent pure, it requires only melting to be usable commercially, and this is done by the people who buy the metal as it comes from the plant.



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Great Leaching Tanks in Which the Ore-Laden Rock is Separated from the Oreless Rock by a Flotation Process: The Ore Conveyor is Shown at the Far Side of the Tanks

OLD BOSTON GIVES RELIC TO NEW BOSTON

A happily conceived act of international courtesy which helps to unite

Old Rail before Which the Pilgrims Stood on being Summoned to Trial in Boston, England

COURTESY OF THE BOSTON EVENING TRANSCRIPT

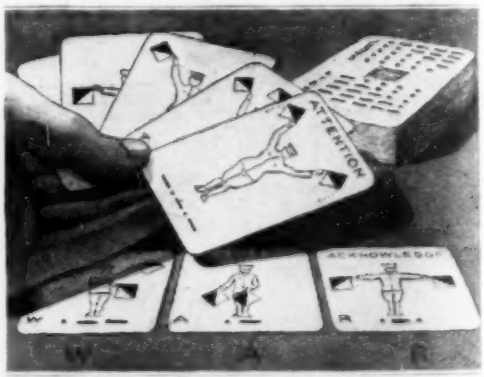
the United States with the mother land is the recently announced proposal of the people of Boston, England, to present a most interesting relic of Pilgrim days to Boston, Mass. The gift to be tendered is the old wooden rail which was in the court room of the Boston, England, guildhall and before which the Pilgrims stood when called to trial shortly prior to their embarking for America. In 1878, the court room was remodeled and the massive rail, on being placed outside the building, became overgrown with vines and shrubs. But it is still in surprisingly good condition and on arrival in the Bay State capital will be given a place of honor.

FIND SEVERAL SUBSTANCES HAVE SELENIUM QUALITIES

Recent investigations conducted by the Bureau of Standards have disclosed that selenium is not the only substance whose electrical conductivity is affected by light. Those qualities which, popularly at least, have been considered peculiar to crystalline selenium, were observed during the experiments to be possessed in varying degrees by several other substances. Among them are jamesonite, cylindrite, silver sulphide, bismuthinite, boulangerite, stibnite, and molybdenite.

NEW CARD GAME TEACHES SEVERAL SIGNAL CODES

Various signal codes have been utilized in designing cards for a new card game, the playing of which soon teaches one the meaning of the symbols and signs employed by American and foreign fighting forces. There are 29 cards in the pack, and on the back of each of 26 of them is a different flag which, by the international code, indicates the letter shown on the other side in Roman characters, by the Morse code, and in United States semaphore signals. The three remaining cards have special values and functions. Two to five persons play the game, an object of each player being to discard his cards as rapidly as possible by spelling words with them. Failure to make a word when it is possible can be detected by an opponent who sees the



Various Signal Systems have been Utilized in Designing These Playing Cards Which Soon Teach the User the Rudiments of the Respective Codes

back of the cards and so can exact a penalty from the neglectful player.

¶ German losses in man power to date are: dead, 2,000,000; wounded, 4,000,000; permanently disabled, 2,000,000.

FRENCH HAVE VAST PLANS FOR FUTURE OF SAHARA

The significance of the establishment of the Moroccan protectorate in northern Africa by France has been overshadowed in the popular mind by war news. Nevertheless few events in modern history have as important a bearing on the future development of a region which comprises 45 per cent of the whole dark continent and contains one-fourth of its population. The vast lands now under French control are for the most part desert, but persistent research by Frenchmen has shown that the Sahara is not worthless. When it is supplied with water it proves as abundantly fertile as many arid regions in the West.

It is fortunate, too, that water is within reach. When wells have been drilled in properly selected places it comes to the surface in abundance. Already the men from Europe are creating oases in many places. One of the big features of France's program for the development of this territory is the connecting up of the reclaimed areas by railway lines. The biggest project of this sort is to construct a line from the Mediterranean across the Sahara to Lake Chad in the Sudan and then extend it southward through the Congo, using some existing Belgian lines, and connecting with the Rhodesian railways at the Katanga border. This would make a much shorter route to Cape Town for western Europeans than the Cape-to-Cairo line.

GASOLINE TRUCK IS BUILT FOR INDUSTRIAL PURPOSES

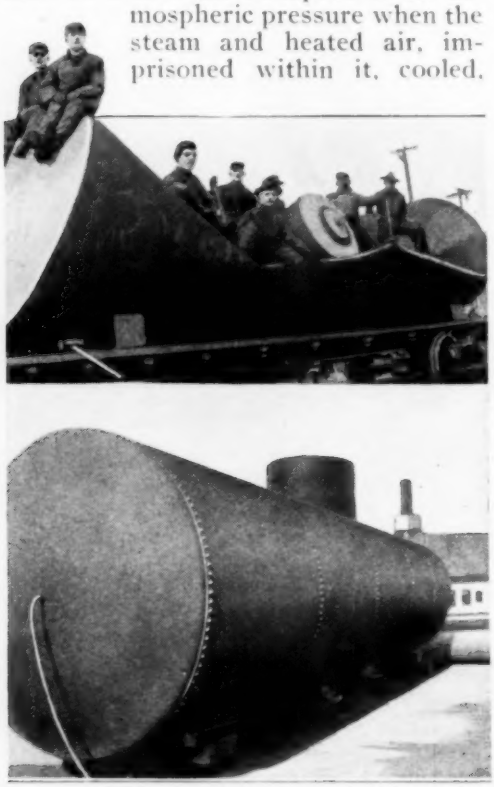
Of compact design is a new gasoline-driven industrial truck of current introduction. It has a wheelbase of 50 in., is equipped with a four-cylinder motor that delivers 12 hp., and has sliding-gear transmission with three speeds forward and one reverse. The forward part of the chassis supports a platform designed to accommodate a 4,000-lb. burden. In addition to this, a 3½-ton load may be towed. The platform is hinged so as to give ready access to the power plant mounted beneath. The forward speed range is from 2.4 miles to 7.6 miles an hour. The operation of the engine is controlled by a foot accelerator, and a spark lever, provided on the dash.

The Platform Raised, Showing How Access is Gained to Power Plant for Adjustments and Repairs

Operation of the Engine is Controlled by a Foot-Manipulated Accelerator, and a Spark Lever Installed on the Dash

COLLAPSED OIL TANK MADE GOOD AS NEW

An account of how a steam-filled tank on a tank car collapsed under atmospheric pressure when the steam and heated air, imprisoned within it, cooled, was told in a recent number of Popular Mechanics Magazine. As the pictures taken shortly after the accident indicated, the big container was almost beyond repair. Nevertheless skilled workers undertook its reconstruction and eventually made it as good as new. The accompanying photograph shows the tank demounted and rebuilt. On being filled it was found to be without a leak.

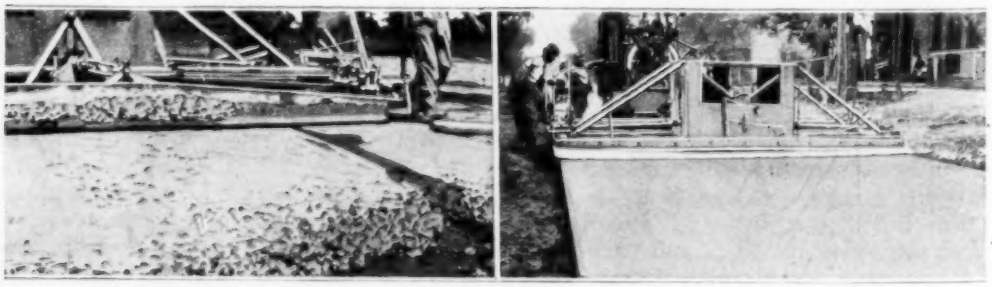


Above: Collapsed Tank and the Crew That Undertook to Repair It. Below: The Tank Demounted and Made Good as New

NEW MACHINE FINISHES CONCRETE ROADS

A labor-saving machine has recently been built for finishing concrete roads, a task heretofore commonly done by hand. The new equipment makes it possible to lay stiffer, and hence stronger, concrete than laborers using ordinary tools can handle. It is mounted on four wheels which travel on the top of the forms either side of the roadway, moving forward at a speed of 7 ft. per minute and backward at 28 ft. per minute, under the control of the operator, who is seated in the machine.

As the finisher moves forward, a template spreads the concrete, giving it the proper height and crown. Immediately back of the template is a tamping device. The first time the machine travels ahead, the tamper is set to deliver a long, hard stroke, while the second time the stroke is quicker and gradually decreases in length, agitating the concrete and completing the thorough mixing of the mass. At the rear is a float having a canvas strip along its edge, which is drawn over the concrete, giving it a smooth finish. The thorough action of the tamper tends to drive the larger stones downward and remove all air pockets from the mass of the material.



Left: Front View of the Machine Showing the Template Which Gives the Proper Crown to the Concrete. Right: Rear View of the New Concrete-Road Finishing Machine Showing the Float with Canvas Attached, Which Imparts a Smooth Surface to the Concrete

ASSIGN "FLIGHT" SURGEONS TO AVIATION CAMPS

In order that a very careful watch may be kept on the physical conditions of airmen in our army, who necessarily are under severe strain, "flight" surgeons and physical directors are to be assigned to the aviation training fields and camps in this country and in France. These men will live in close daily contact with the fliers and will direct their rest and recreation so that it will be beneficial rather than harmful. The surgeons will also seek to promote the well-being of the men in many other ways.

WINE GRAPES MAY BE USED TO MAKE SIRUP

A professor in the University of California, it is reported, has worked out a satisfactory method for converting wine grapes into sirup. According to estimates, as much as $17 per ton can profitably be paid for grapes to be used for this purpose. It is pointed out that utilizing this important California product in this way would help relieve the present shortage of sugar and would enable the grape growers to avoid financial loss in case the state or nation goes dry.

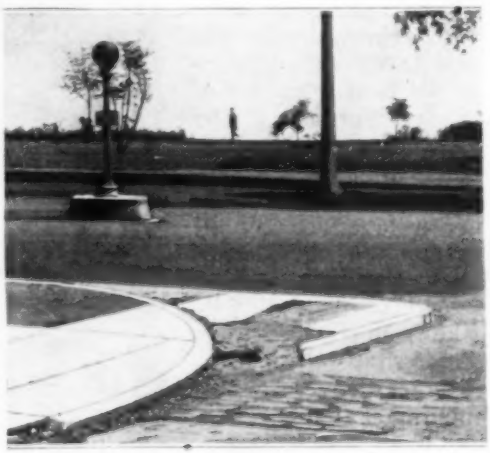
STRAW GAS AS MOTOR FUEL IS TESTED IN CANADA

Straw gas is the newest of all wartime substitutes for gasoline. It has been produced by the head of the department of chemistry at Saskatchewan University, in Canada, and successfully employed as motor fuel. During experiments conducted within recent weeks, it has been found that 300 cu. ft. of the gas is equivalent to about one gallon of gasoline when used for automobile purposes. A ton of straw produces between 11,000 and 12,000 cu. ft. of gas. The investigating work has been done particularly with the thought that straw gas, in the event of restrictions being placed on civilian use of gasoline, might be made an economical fuel for motor owners in rural districts of Canada and the United States, where illuminating gas is not available.

The Rubberized-Fabric Container Holds 300 Cubic Feet of Straw Gas, Which Is Capable of Giving the Same Mileage as a Gallon of Gasoline

ROUNDED STREET CORNERS A HELP TO MOTORISTS

The increase of motor traffic on city streets has made it advisable in one large city to round off the almost square corners at street intersections, particularly where other thoroughfares enter boulevards. Instead of the old curve with its 1½-ft. radius, the curbs at a number of the street corners are being remade on a 14-ft. radius.



Street Intersection in Process of being Improved by Rounding Off the Corner Which, When Square, Was Always a Hindrance to Motor Traffic

TRAVELING RESTAURANT BRINGS MEALS TO HOMES

By GEORGE F. PAUL

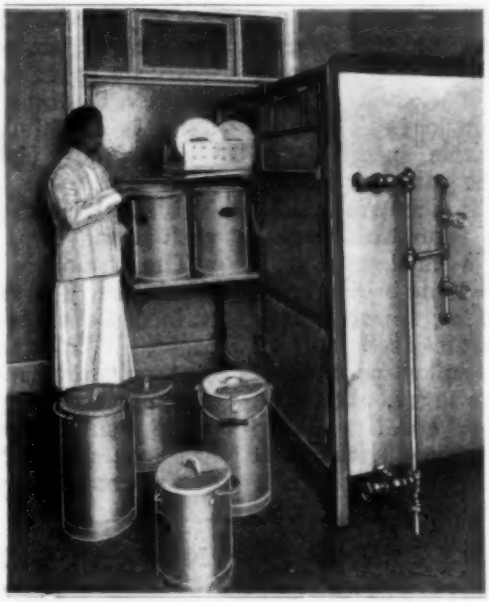
A HOME meal prepared without a particle of effort to the housekeeper, and yet served right on time and warm—that is the dream that has come true for hundreds of families in New York City, thanks to modern business methods in operating the community kitchen. In the absence of servants called to other work through the demands of war, it certainly is a great relief to the woman at the head of the house to know that at the appointed hour for dinner a lavender-colored automobile will whiz up to the door, and an attendant in livery will take from it a neat container that will prove a treasure trove, for on opening it there will be found, in the most appetizing form, all the regulation courses from soup to dessert. In a jiffy after the arrival of this magic receptacle the announcement can be made, "Dinner is served." And as for tomorrow, the housewife simply checks off on a printed menu the order for the next day, and then that is taken care of.

One of the Spotless Rooms in the "Community Kitchen" Where the Salads are Prepared and Dished Up into the Portable Containers

These motor cars, or traveling restaurants, come from an establishment remodeled especially to furnish this service. On the first floor is a reception room that opens into the long room where the meats and vegetables are cooked and all the hot dishes prepared. One feature of the equipment here is the big, ovenlike arrangement for sterilizing the containers that are brought back from the patrons. Everything

The Long Room in Which the Meats and Vegetables are Cooked According to the Most Approved, Scientific Methods

from utensils to cooks and attendants is neat and trim as the proverbial pin. Upstairs the wholesome, appetizing salads are prepared. Crisp, cool lettuce leaves with circles of green peppers, and tiny receptacles for the dressing, are snugly stowed away in one container, and in another is placed cake; in another, gems or muffins. Some of the orders are for two dinners, some three, and some four, and so on. Soon the containers are all ready, so they are sent downstairs attached to other containers intended for the same family, and then away they go right to the family table. Each aluminum vessel acts as a large heat retainer, keeping the food in such condition that it seems to have come right from the range.



Containers in Which the Meals are Kept Hot in Aluminum Pans, Placed One above the Other, Until Delivered to the Patrons

The aim of the organization is to keep homes together during the great draft of women into industry during the war, and to release women for war-service work. The service is designed to reach all groups, the business and professional woman, the dweller in the hall bedroom who longs for home meals but has no means to cook them, the families on small income who do not have maid service, the large family where the work devolves upon the mother, the dweller in the private home and in the highest type of apartment building.

The service has proved such a success that 2,000 people are on the waiting list. It is not a charity or a philanthropy, but a pure business project incorporated under the laws of New York. The earning power is limited to six per cent, and all excess profits will be turned back into the business to react for the benefit of the consumer. As for war regulations, it would delight the heart of Mr. Hoover to see how war flours and war substitutes are used. The family, for instance, that orders a meal rich in fats gets no butter with that dinner.

Most of the subscribers to the service favor what is known as the 50-cent meal. Being a regular patron means

A New Type of Household Servant: The "Community Butler" Who Employs a Lavender-Colored Automobile for Serving, in Place of a Tray

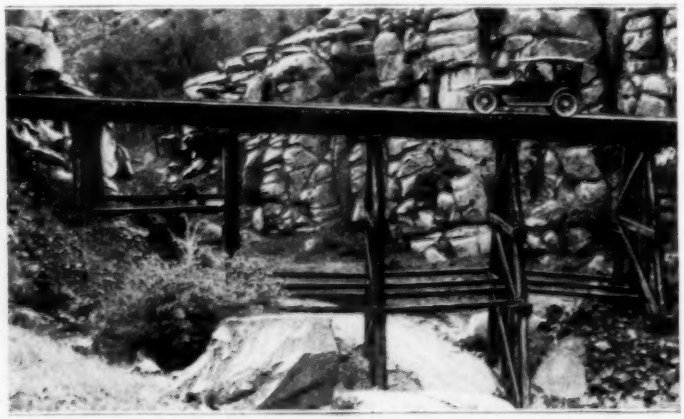
that the service is wanted for five or more nights in the week. For convenience in handling these orders a coupon book has been arranged. A representative menu for the 50-cent dinner would include soup, very nearly a half-pint measure of it, then a choice of roast beef or nut loaf. The beef order, unless otherwise specified, includes a piece of the rare, a piece of well-done, and a small piece of fat. The nut loaf is a square about four inches by an inch or so in thickness, with tomato sauce. Then come brown potatoes, one if they are large, two if they are small. A moderate-sized ladle of buttered beets, a similar portion of cauliflower in cream sauce, and salad will follow. The salad consists of two large leaves of head lettuce, with cream cheese and French dressing. Then comes the dessert—either cottage pudding with sauce, or a portion of lemon jelly.

The 35-cent dinner is planned for families of six or more, and is especially designed with the wants of the children in mind. On the other hand, there is the dollar dinner, which includes a more elaborate menu, starting with grapefruit, olives, and radishes, featuring roast turkey and concluding with lemon pie.

The station is operated on a scientific basis. The menus are prepared by trained dieticians; the foods by skilled cooks. Wholesale buying brings the best on the market. Economy commensurate with good service and adequate results is the high standard that has been established by the promoters of the community kitchen.

HIGH RAILWAY BRIDGE USED BY MOTORISTS

Motoring across a mountain gorge in Colorado, on a railroad bridge, is less difficult and precarious than it might appear, because the railway line of which the structure is a part, has been converted into a splendid highway and the bridge resurfaced for motor and horse vehicles. This abandoned railway is 40 miles long and connects Cripple Creek with Florence, which is nearly 6,000 ft. lower.



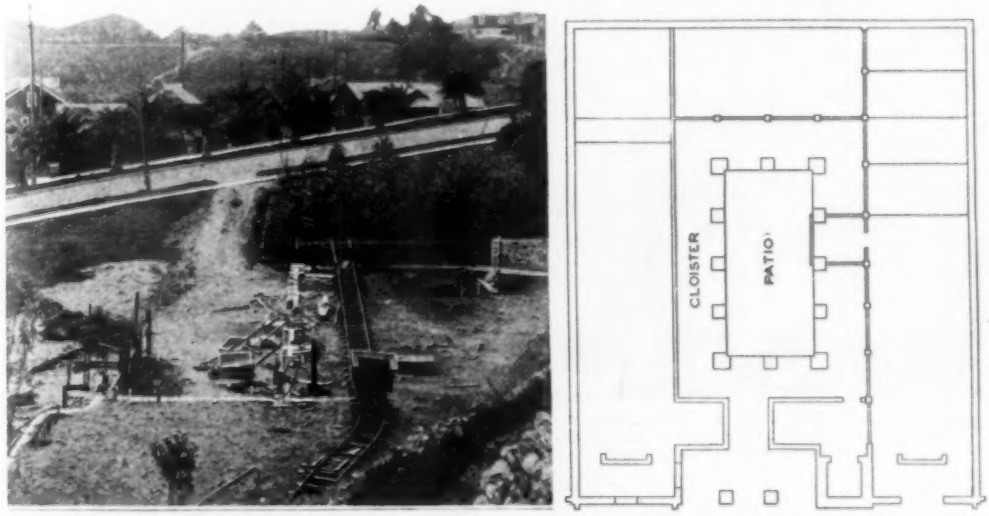
Bridge on an Abandoned Railway Line in Colorado Which has been Transformed into a Splendid Mountain Highway: This Structure has been Resurfaced for Motor and Horse Vehicles

NORWAY OBTAINS SEA SALT BY NEW PROCESS

A new process for recovering salt from sea water has been worked out by a Norwegian engineer and has been reported on favorably by investigators appointed by the Norwegian government. The process appears to be one of electrolysis in combination with evaporation by heat produced electrically. Besides common salt, magnesium, gypsum, iodine, bromine, and other substances are obtained as by-products. A plant is to be built on the west coast of Norway to produce salt by the new method, and if it proves a success others will be erected. It will have an output of 50,000 tons per year, and it is hoped that eventually the necessity of importing large quantities of salt, as is now done for use in the fishing industry, and other lines of business, will be eliminated.

LONE MAN DEVOTING YEARS TO BUILDING ODD HOME

Front Elevation of the Strange House, to the Construction of Which One Man is Devoting Years: The Interior of the Dungeon with a Chain Hanging from the Wall is Shown at the Right



The Left-Hand View Shows the Foundations under Construction and the Car Used in Hauling Materials. At the Right Is the Ground Plan of the Structure, Which is Patterned Somewhat after the Old California Missions

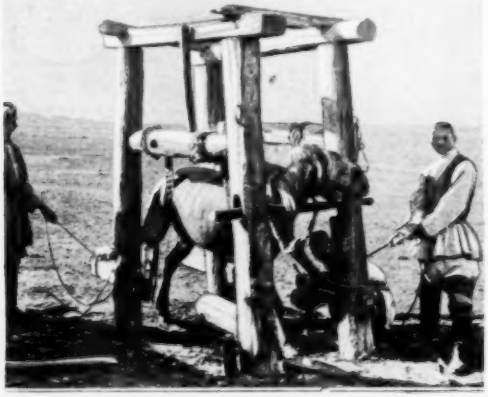
For more than three years a resident of California has been engaged, unaided, in constructing a curious edifice which eventually will be his home and will also house a small printing plant which he operates. The building will somewhat resemble the old California missions, and because the owner is doing all the work alone in his spare time, it will require seven years more to complete it. The foundations measure 50 by 62 ft., and the outside stone walls are 42 in. thick at the base. A small chapel, a bell tower with iron steps leading to the belfry, a wine cellar, and a dungeon with a truly medieval appearance, are striking features already under construction. There will also be a cloister and a "sacred garden" patterned after the one at Santa Barbara. The roof will be covered with red tile made on the spot.

The bulk of the materials used is obtained in the immediate vicinity, sand and stones being taken from the hillside. When a street improvement was put in close by, several loads of discarded concrete blocks were obtained and utilized in the building. A dump car running on a track is employed in moving the bricks, stone, and other material. Much patience is required by the lone builder in handling heavy boulders and the like.

The builder has friends in many parts of the world, from whom he has obtained material or objects that are to be incorporated into the structure. These include a fragment from the Great Wall of China and bits from each of the California missions.

KURDISH HORSESHOER USES SAFETY-FIRST DEVICE

Either horseshoeing is more hazardous in Kurdistan than in America or else the horseshoers there are more



Primitive Equipment Used by a Horseshoer and Assistants in Kurdistan to Keep an Animal from Kicking While being Shod

timid, for the accompanying photograph, taken near a village in that country, indicates that the native smith believes thoroughly in "safety first." Not only is the horse, which is to have new footwear, securely tied by a halter, but its whole body is almost raised from the ground with a primitive windlass, and one hind foot and one fore foot are tied with ropes to horizontal beams, so that kicking is impossible.

MORMON GRANARIES EMPTIED FIRST TIME IN YEARS

During the past summer more than 250,000 bu. of wheat were turned over to the Food Administration by the Mormon Church which, for the first time in over 30 years, swept its vast granaries clean. Brigham Young many years ago established a tithing custom to safeguard his followers against possible famine in case of crop failures. After each harvest a tenth of their yield was sent to the church granaries by Mormon farmers. Year after year this great store of grain has been collected, held in reserve, and drawn upon for seed at planting time. Until the world emergency presented itself, nothing had ever been allowed to interfere with the practice. The new crop, however, has replenished the church reserve.

MAKE PERILOUS DESCENT INTO VOLCANO CRATER

At grave personal risk two scientists, one of them an American, recently descended into the crater of Mount Vesuvius to ascertain more about an explosive gas, resembling hydrogen, which the famous volcano emits from time to time. The men went far down toward the bottom of the crater and remained in that perilous position nine hours, making tests with apparatus which they took with them.

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An American Scientist Far Down in the Crater of Vesuvius Listening to Subterranean Rumblings and Explosions: The Perilous Journey was Undertaken to Study Certain Explosive Gases That are Emitted

COURTESY OF SEATTLE TIMES

An Indian Chief and Thirty-Odd Members of His Tribe Journeying to Berry Fields in a Truck and Trailer Which Made the Trip in a Few Hours, Instead of Several Days, as Was the Case When Traveling in Primitive Fashion

INDIANS TRAVEL TO BERRY FIELDS IN MOTOR TRUCK

A western Indian chief, Running Deer by name, and members of his tribe to the number of 35, like certain up-to-date gypsies, have abandoned their primitive mode of travel for motor vehicles. The red man and his followers often make a trip to certain rich berry patches, and this year, instead of occupying several days with the journey, they made it in a few hours by motor truck.

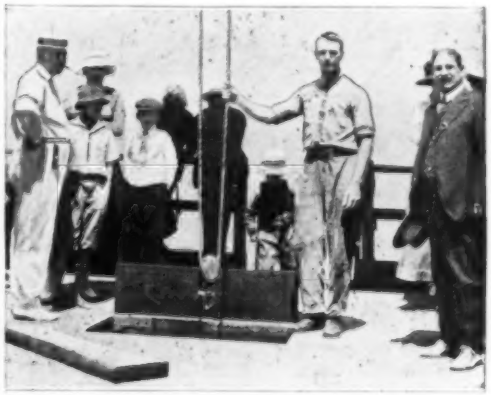
UNIVERSITY ESTABLISHED AT BELGIAN FRONT

Nearly 200 students have been enrolled in a university that has been established at the front by the Belgians. The institution confers degrees in philosophy and literature, and has courses in other subjects. Soldiers, eligible and anxious to avail themselves of its benefits, are detached from their regiments and sent to the university. Considerable difficulty has been experienced in obtaining competent instructors, but the move itself, which is the first step that has been made to reëstablish former conditions in pillaged territory, has met with great approval.

¶On September 1st loans to our allies totaled $7,092,000,000.

HOIST BIG FISH TO DOCK THROUGH TRAPDOOR

By cutting a trapdoor in the floor of the fish-handling dock at a California town, and installing a power windlass above it, provision has been made for hoisting large fish from the boats as they come in. Heretofore for many years fish weighing 300 lb. and more have been dragged up a stairway. This has been a back-breaking method at best, and with the sea running a bit, it has been almost a battle at times. The present arrangement enables the boats to be run under the dock, which



Making Ready to Hoist a Big Fish to the Dock from a Boat Riding beneath the Trapdoor

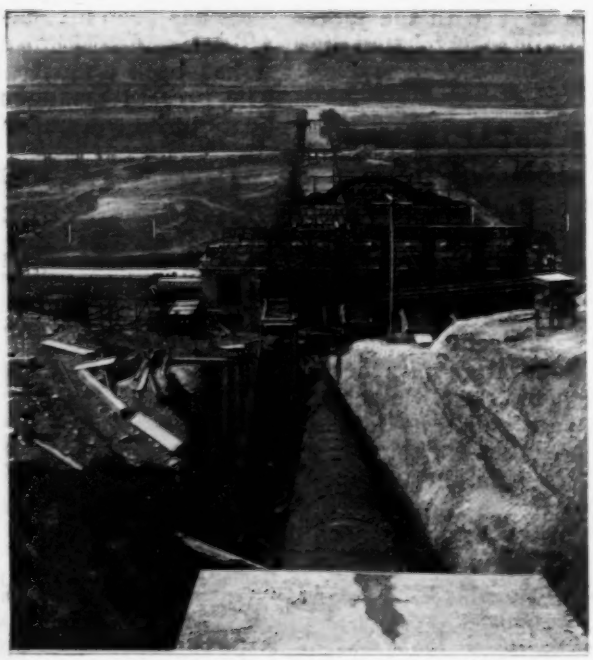
is possible even at high tide, and the fish to be hoisted and swung onto a truck with little or no effort.

Utilizing Glacial of Mount Rainier

Development of the Great Power Enterprise has River at the Point Here Shown above the Town of Carried into a Chain of Lakes That Forms a

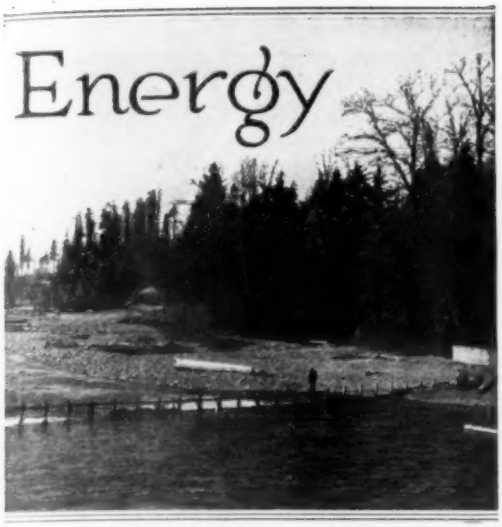
Many elements have combined to make the White River power project in Washington a development of exceptional interest. Chief among them, perhaps, is the remarkable way in which the processes of nature for centuries past have worked to facilitate the modern exploitation of the power resources of the Mount Rainier region. Yesterday an enormous glacier laid an unexcelled site for a great hydroelectric plant, and today glacial rivers drive huge turbines and generators.

The White River plant, the largest and most important in the Puget Sound district, is situated about five miles from Auburn, Wash., at the base of a high plateau. This is the moraine of an ancient glacier that at one time pushed out from the mountains and into the basin of the sound. The plateau is triangular in shape, and its depressions today form a series of connected lakes, of which Lake Tapps, at the apex of the moraine, is the largest.



Looking Down the Third Penstock That Carries Water to the World's Greatest Hydroelectric Generating Unit, Which is Installed in the Power House Below

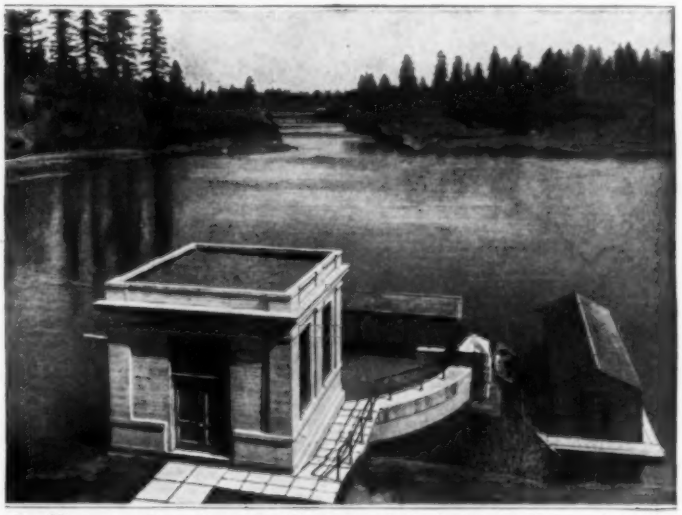
Development of the great natural source of energy has involved the diversion of White River



Involved the Diversion of White Buckley, so That the Water is Gigantic Storage Reservoir

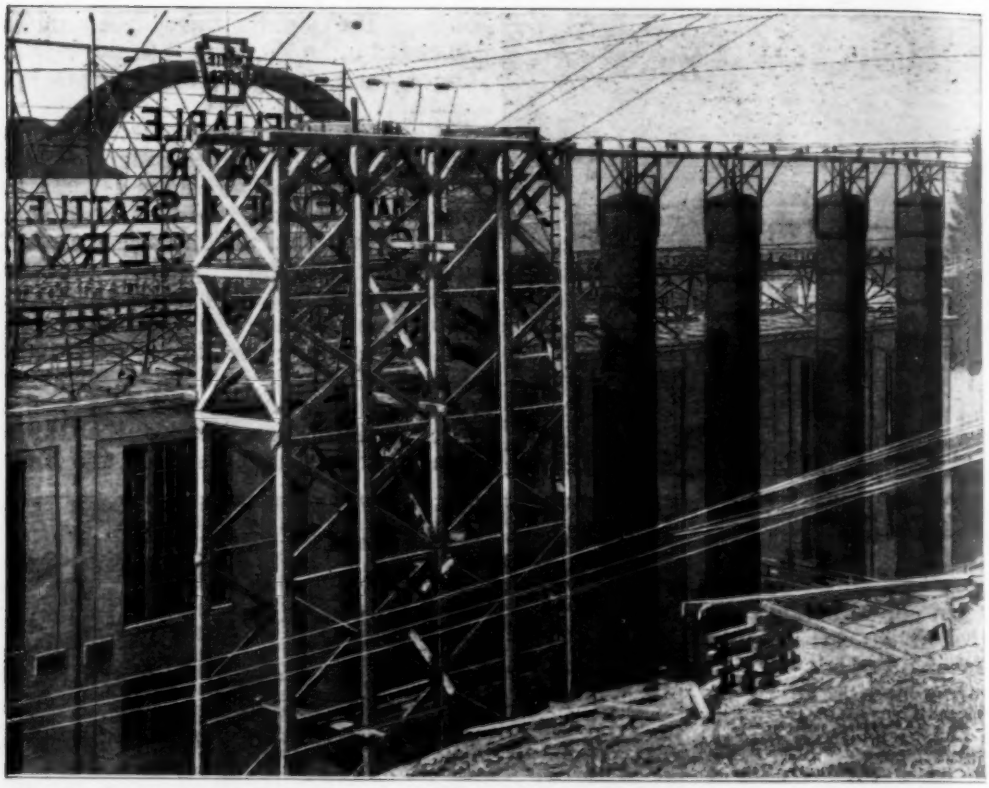
at a point above the town of Buckley, so that it is carried into the chain of lakes which forms a storage reservoir holding approximately 2,250,000,000 cu. ft. of water. Under a net head of 440 ft. this is equivalent to 18,000,000 kw. hours. The actual head, however, is 465 ft. Ultimate development will give this plant an estimated capacity of 130,000 hp. The present capacity amounts to 65,000 hp.—a new rating resulting from the recent installation of a 25,000-hp. turbine. This is the plant's third unit and is conceded to be the largest in the world. The other two are each of 20,000-hp. capacity.

Water is taken from a fore bay, in Lake Tapps, through a concrete-lined tunnel, 12 ft. in diameter and 3,000 ft. long. At the outlet of this bore is a second fore bay which serves as an equalizing reservoir. It is here that the water enters the steel penstocks, which are 8 ft. in diameter at the intake end and 6½ ft. in cross section at the power plant, in the valley below. The tubes are 2,500 ft. in length and feed water at a uniform pressure to the three great turbines at a head of 465 feet.



The Water is Taken from the Fore Bay in Lake Tapps, Pictured Above, through a Concrete-Lined Tunnel 3,000 Feet to the Second Fore Bay, Which Serves as an Equalizing Reservoir

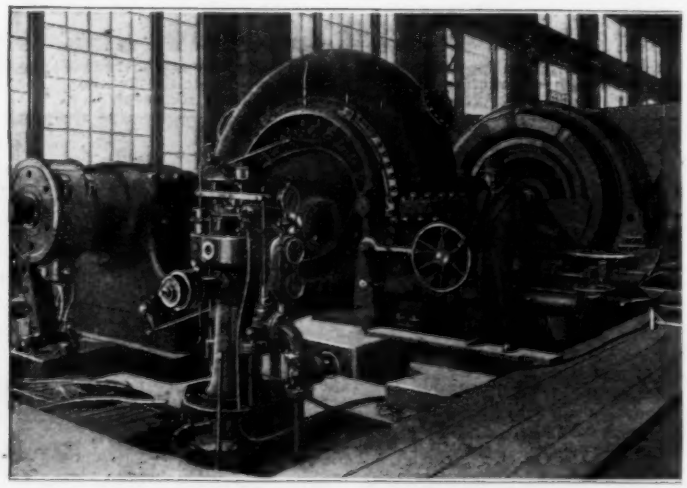
Picturesque Stretch of Canal That Carries Water into the Upper Lake: The Region Is Far-Famed for Its Magnificent Mountains, Glacial Rivers, and Lakes, and of Late has Become Almost Equally Famous as a Source of Power



Each Penstock is Supplied with Two Air Cushions, 7 Feet in Diameter and 75 Feet High, Filled with Compressed Air. These Devices Assist in Maintaining a Practically Constant and Uniform Water Pressure

The White River plant is one of five separate power developments made in the Puget Sound district. All of these are interconnected and, with auxiliary steam plants, at present give a combined flow of more than 160,000-hp. of energy.

This power is used for operating railways, street-car lines, interurban cars, and driving machinery at numerous points, as well as for lighting approximately 132 towns and cities in the surrounding territory.



The Newly Installed 25,000-Horsepower Turbine and Generator, Which is Reputed to Be the Largest of the Kind in the World: This Installation, Recently Completely, Increased the Capacity of the White River Hydro-electric Plant to 65,000 Horsepower

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¶A Munich chemist is reported to have discovered a method of obtaining large quantities of an oil, the equal of coconut oil, from low organisms that live in stagnant waters.

WHOLESALE DEATH OF BEES DUE TO POISONED FLOWERS

Poisoned flowers in the Santa Monica Mountains of southern California have caused serious injury to the bee industry in that district. Thousands upon thousands of bees are reported to have been killed. The work is believed to be that of German agents or sympathizers. When the bees began dying in wholesale numbers, laboratory tests were made, which revealed that they had been killed by poison. Further investigation disclosed that the flowers in the vicinity bore the same poison. Its character and the methods used in spreading it have for obvious reasons been concealed. Armed guards have been stationed in many of the bee districts, and a reward of $5,000 has been offered by the California Association of Bee Raisers for the capture of the miscreant who maliciously spread the poison.

CHURCH HAS ROOF GARDEN FOR SUNDAY SCHOOL

Semitropical summer weather affords little excuse for members of a large Sunday school in Florida to be absent from the regular sessions, for the school meets on a spacious roof garden which is a pleasing and serviceable architectural feature of the modern church building. In this sightly meeting place there is always shade and a cool breeze from the bay near by, even on the warmest summer days.

Modern Church Edifice of Which a Breeze-Swept Roof Garden Is a Serviceable Feature: Here the Sessions of the Sunday School are Held in Warm Weather

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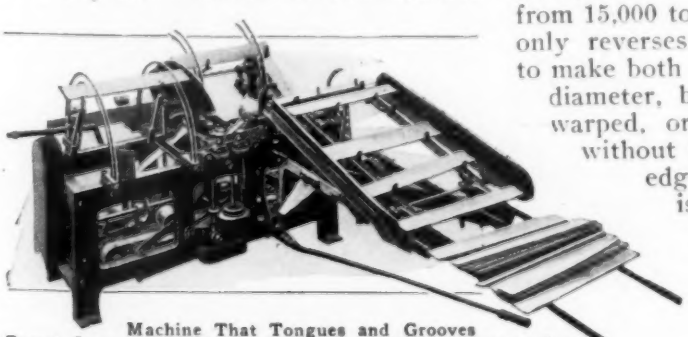
BARREL MACHINE TONGUES AND GROOVES STAVES

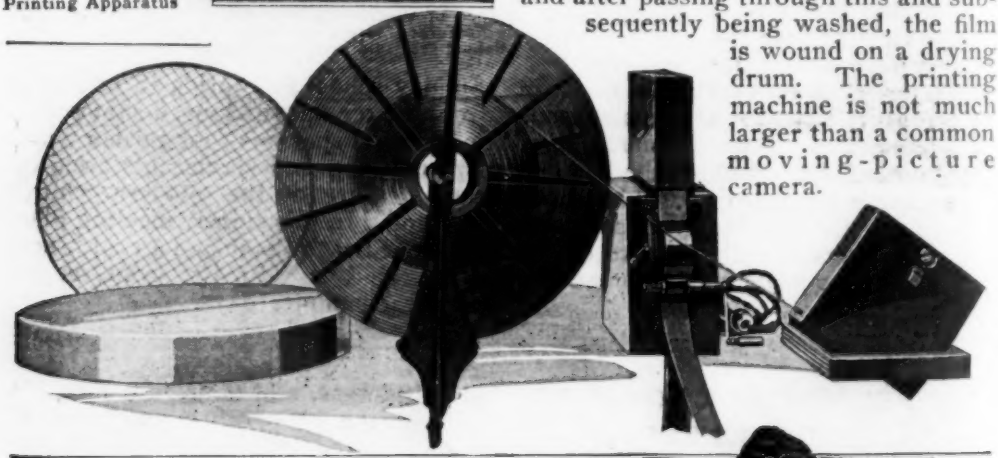
Of late a machine has been developed for tonguing and grooving staves, so that perfectly tight and sanitary barrels may be made for such commodities as salt, sugar, and flour. So far as is known, the only other apparatus of the kind used in America is a clumsy German-made contrivance that was introduced before the war and employed by a few domestic concerns. The new machine, with a capacity of from 15,000 to 20,000 pieces a day, not only reverses alternate staves so as to make both ends of a barrel alike in diameter, but also works crooked, warped, or cross-grained material without tearing or roughing the edges. Only one operator is required, for the staves are automatically discharged. The machine is driven by a small electric motor that consumes little current.



Machine That Tongues and Grooves Barrel Staves, Handling as Many as 20,000 Staves a Day

TANK DEVELOPER FOR MOVIE FILM USED IN ARMY

Making Positives for Projection with the Aid of the Exceedingly Compact Printing Apparatus



The Developing Tank and Reel are Shown at the Left, and, Second from the Right, Is a Close View of the Printing Machine

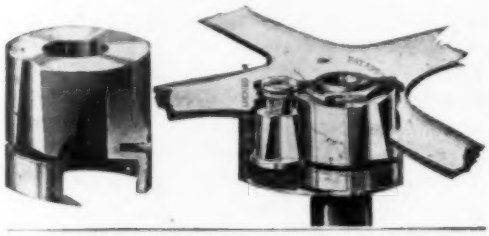
Adapted particularly for army use is a very compact tank outfit designed for developing moving-picture films. The apparatus, in connection with an exceedingly small printing machine, forms equipment that is easily portable and understood to be well suited for field conditions. In use at one of the flying fields where some 40,000 ft. of film was recently exposed, developing and printing by this method was executed satisfactorily. The fact that certain exploration parties have used the equipment with success within recent months also tends to indicate its possible military value. The developing outfit consists of three telescoping tanks into which a metal, acid-proofed developing reel, on which the exposed film is wound, is successively placed. The tanks are about three and a half inches deep and 16 in. in diameter for developing reels of 100-ft. film capacity. Reels that receive as much as 400 ft. of film fit into tanks of about 28-in. diameter. The process is practically as simple as the handling of ordinary kodak work. The reel on which the film is wound is immersed in the developer contained in the first tank. From this it is transferred to the second receptacle, in which it is rinsed. The third tank holds the fixing bath, and after passing through this and subsequently being washed, the film is wound on a drying drum. The printing machine is not much larger than a common moving-picture camera.

Winding a Film onto the Developing Reel, Which is Placed Successively in the Three Tanks Visible in the Foreground

The big advantage of the outfit is that it enables both developing and printing to be done in a dugout, covered truck, or almost any shelter that affords darkness and electric current.

LOCKING STEERING WHEEL OF NEW CONSTRUCTION

Valuable features are found in a new locking steering wheel that has been developed for motor cars. Chief among them is the impossibility of a free wheel occurring while a car is being driven. The lock has 19 spring tumblers and is capable of so many variations that no master key can be made for it. The wheel consists of an 18-in. hard-aluminum spider and a machined-steel bushing that is keyed to the steering shaft the same as is an



At the Left Is the Machined-Steel Bushing That is Keyed to the Steering Shaft. Right: Phantom View of the Hub of the Locking Wheel

ordinary steering wheel. To provide a free wheel, it is only necessary to give the key a half turn. Withdrawal of the key causes each of the tumblers to spring into a recess, preventing the lock from being turned until the key is reinserted and turned in the opposite direction.

COMPACT COUNTING MACHINE HANDLES SMALL COINS

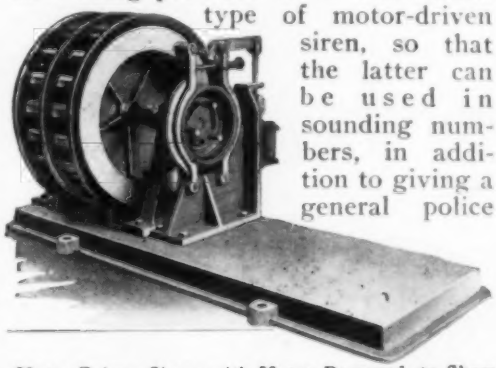
Compactness and simplicity of construction are features of a coin-counting machine that has been developed for use wherever large volumes of money of small denominations are handled. Like some other devices of similar character, it materially reduces the time and labor usually involved in counting rooms, and also practically eliminates the chances of error, which cannot be wholly escaped when the work is done by hand. This particular machine will accurately count and bag

At the Top the Machine is Shown in Use with a Reserve Coin Tray and Bagging Attachment. The Other Picture Gives a Closer View of the Counter

pennies, nickels, dimes, or quarters at the rate of 72,000 an hour. It will count and package 24,000 coins in a similar period, and may be adjusted to count continuously, or in quantities of 20, 25, 40, or 50 coins.

FIRE-ALARM SIREN HAS SOLENOID BRAKE

A special electromagnetic brake is now being provided for a well-known type of motor-driven siren, so that the latter can be used in sounding numbers, in addition to giving a general police



Motor-Driven Siren, with Motor Removed, to Show the Solenoid Brake with Which the Rotor can be Stopped in 12 Seconds, Making It Possible to Signal Numbers as Well as Give a General Alarm

and fire alarm. It is mounted on the axle between the siren proper and the motor and is controlled by a switch, installed to suit the convenience of

those in charge. When the switch is pulled it will bring the siren to a stop within 12 seconds, though in actual operation it is not necessary to wait until the rotor stops revolving entirely. The improved feature makes it possible to indicate by signal the number of a ward, or call box.

ADORNED ONE-POUND SHELL IS WORK OF SOLDIER

An unusual piece of metal work made by one of our soldiers during his spare hours at the front in France is shown herewith. It consists of an empty 1-lb. shell, on the outside of which a rose has been artistically engraved against a suitable background. The work was done with a rough tool and is typical of the resourcefulness displayed by many soldiers.

PEOPLE UTILIZE NATIONAL FORESTS IN MANY WAYS

That the national forests are being used increasingly by the people is shown by the fact that the receipts from these tracts totaled over $3,500,000 for the past fiscal year, the income being $120,000 greater than in 1917. The sources of this income indicate the variety of uses to which the lands are put.

Fees from cattle raisers amounted to over $1,000,000, and from sheep raisers over $660,000. Timber sales yielded $1,500,000, while leases for summer-home sites, fish hatcheries, canneries, apiaries, etc., brought an additional $120,000. The cost of operating the forests was about $4,000,000, exclusive of extra expenditures caused by the serious fire situation. Much of the use of the forests, of course, is free, settlers and others being allowed to graze stock and obtain fuel and timber in them in amounts specified by the department.

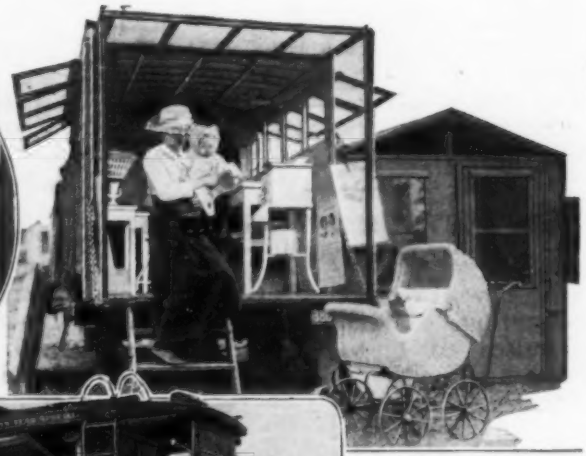
¶ Germany's war debt was $38,400,000,000 on August first.

ORDINARY TOOLS GRIPPED BY MECHANICAL HAND

High efficiency is claimed for an artificial hand that has been devised to enable workmen to carry on their normal pursuits after suffering the loss of a forearm. It has rotary and pivotal wrist movements and is supplied with two sets of interlocking fingers which will grip and hold firmly any ordinary tool such as a saw, hammer, pitchfork, shovel, or pick. One finger of each set is pivoted to a bar that holds its auxiliary. Each of them is also normally held in engagement with its cooperating finger by means of springs.

A Recently Designed Mechanical Hand in Use; Left to Right, It is Shown as Used in Manipulating a Pick, Saw, and Hammer, Respectively

¶ Success in selling Liberty-loan bonds is very largely a matter of overcoming the stinginess of some people, the rapacity of others, and the squirrel instinct in those who have seen hard winters and are afraid of seeing more.



In the Circle Is an Interior View of the Traveling Child-Welfare Station in Cleveland, Showing the Equipment for Weighing and Measuring Children, Six Years Old or Younger. The Car Is in Charge of a Nurse and a Doctor

The Views Above and at the Left Show the Portable House Which Was a Part of the Outfit. For Traveling, It is Folded Up and Attached to the Side of the Car. Note the Abundance of Windows of a Convenient Type in the Latter

PORTABLE HEALTH STATION AIDS CHILD SAVING

The child-conservation campaign in which the whole nation has shared this year was made doubly effective in Cleveland, Ohio, by use of a traveling welfare office. It consists of an automobile truck equipped with chairs, tables, scales, etc., to serve as a station at which children under six could be weighed and measured as the government requested. The truck occupied a new site each day during the summer and was in charge of a nurse and a physician, representing the city health department and organizations interested in child welfare. Medical advice was also given at the station.

SLOPING FRONT YARD MADE INTO OUTDOOR THEATER

Taking advantage of the slope of his front yard, a resident in the West has fashioned his land into a series of semicircular terraces, forming an outdoor amphitheater that seats 300 persons. Volcanic rock, blasted near by, was used in building the retaining walls for the terraces. Oaks and bay trees surround the novel recreation

Transforming a Sloping Front Yard into an Amphitheater Which Seats 300 Persons: Volcanic Rock was Used for the Terraces

center, protecting it from the wind. The stage occupies a level area a few feet in front of the lowest tier of seats. Pools of water close by, fed by a spring, add to the attractiveness of the spot.

NEW INSTRUMENT MEASURES RESILIENCY OF FELT

A new precision instrument for measuring the resiliency of materials promises to be of special value to concerns

With This Instrument It can be Definitely Determined Whether Felt and Other Materials Conform to Predetermined Standards of Resiliency

using felt, rubber, and other resilient substances. The article to be tested is placed on a small anvil forming a part of the device and the presser foot of a plunger connected with a gauge graduated to .001 in. is lowered onto it without pressure. The reading obtained indicates the thickness. By means of a quadrant pivoted to an arm above the gauge, the plunger is then pressed down into the material. The normal thickness compared with the thickness under pressure furnishes the basis for determining the hardness of the material. By measuring the thickness after being released from pressure a basis for calculating the resiliency is furnished the observer.

IMPORTED REINDEER HERD IN NEED OF NEW BLOOD

After having devoted 12 years to breeding Lapland reindeer in northern Newfoundland, in order to provide that region with hardy draft animals, the persons in charge of the undertaking have arranged to transfer the 300 animals which remain in the herd to Canadian Labrador. At one time the number of reindeer had increased to 1,200, but because of too much inbreeding the stock deteriorated, and the animals died off rapidly. In the region to which the herd is being taken, lying across the Straits of Belle Isle from the island, it is proposed to introduce a strain of native caribou in the hope of strengthening the stock.

NEW HOSPITAL SHEETING IS VERY DURABLE

A white hospital sheeting is now being manufactured which, tests have indicated, will withstand sick-room usage exceptionally well. The fabric is unaffected by boiling soap and water, strong ammonia, chloroform, blood, turpentine, etc. In sterilizing the sheeting it was subjected to a temperature of 266° F. for 30 minutes. This gave it a slightly yellow tinge, but in every other respect it was unchanged by a test which would have rendered ordinary hospital sheeting useless.

GRECIAN TEMPLE OF ART FOR PHILADELPHIA

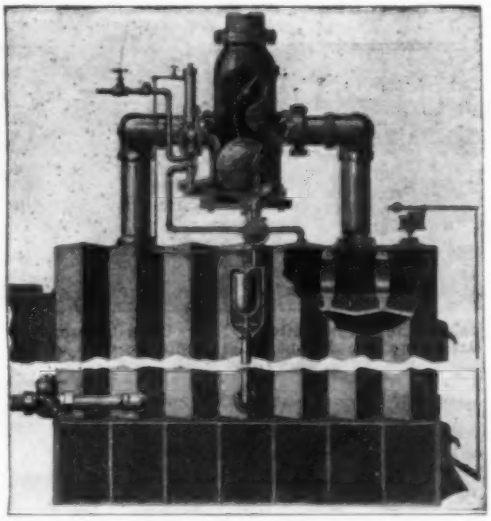
Philadelphia is contemplating the construction of an exceptionally magnificent museum of art. Plans have been completed and a site selected for a structure of imposing architecture that will cost between $4,000,000 and $5,000,000. It is to be erected on a prominence at the entrance of Fairmount Park, where it will overlook a broad plaza facing a delightful boulevard. It is of Grecian architecture, and of two stories with a rez-de-chaussée. The central part of the building,

Plans for Philadelphia's New Museum of Art have been Completed and a Site Selected for Its Erection

as planned, will be 40 ft. in width and 220 ft. long. Extending forward on either side, forming a large court, are wings 120 ft. long and 32 ft. wide. A flight of a hundred broad steps, chiseled in stone, will rise between hanging gardens to a fore court, from which other steps will give access to the main floor of the institution. It is planned that the first floor will be used for offices, studios, and lecture halls. The second level will be given over to exhibits. In all there will be 113 galleries, each of which will have mural decorations and a scientific system of illumination.

CONTROLLER FOR BOILERS PREVENTS PRIMING

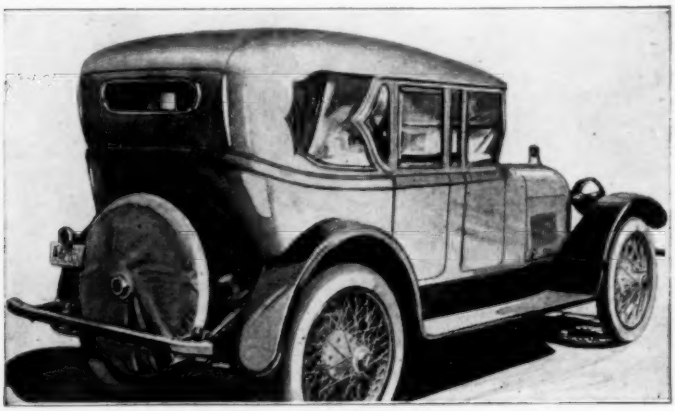
An automatic controller for boilers of high or low pressure, and for vacuum systems, is designed to wholly eliminate priming by returning the displaced water to the boiler and so preventing cracking of sections and explosions. A large chamber, which serves as a steam header and in which is a large float, is a principal part of the controller. At each point where a steam pipe from the boiler enters this chamber is a deflector that throws the water downward into the bottom of the container, from which it flows through a drain pipe back to the boiler. If the water accumulates in the controller faster than it can run off, the float will rise and, by means of a lever connected with a valve, let cold water into the boiler. This, of course, reduces the temperature at once and stops the priming. By proper manipulation of valves, the device can also be used to draw off grease from the boiler.



In Case the Boiler Starts Priming, the Water Which is Not Returned Accumulates in the Controller and the Float Rises, Opening a Valve Which Lets Cold Water into the Boiler

TWO-PURPOSE TOP IS MADE FOR THE TOURING CAR

Removable windows are found in a year-round top lately introduced for motor cars. They enable a machine to be converted from a closed car to a touring car in a moment's time. Special storage carriers for the panes are provided in the tonneau. With the glass removed, the machine has the appearance of being equipped with a one-man top. The superstructure is detachable and may be removed like an ordinary winter top.



The Car Windows may be Removed and Stored in Carriers Provided in the Tonneau

¶ Banks in the seventh reserve district which took their full allotments of treasury certificates of indebtedness issued in anticipation of the fourth Liberty loan are to receive engraved diplomas.

LIGHT INTENSITY MEASURED BY SIMPLE METER

For measuring illumination in terms of foot-candles, an instrument of compact size and simple construction has been developed that may be successfully employed by a layman. With its aid, almost any person is able to make an intelligent study of the lighting conditions in a home, office, or factory, and, with proper coöperation, provide for corrections where needed. The principle of the device is demonstrated by covering a perforation in a piece of white cardboard with tissue paper. When placed between an eye and a light source, the tissue spot appears brighter than the surrounding paper. Viewed from the side of the light source, however, the spot appears darker than the cardboard. If the illumination on both sides is of the same intensity, the tissue spot and the cardboard will be alike in brightness.

Using the Illumination Meter in a Factory to Determine the Intensity of Light at One of the Machines

Close View, Showing Face of the Instrument and Character of the Photometric Screen: The Picture at the Right Gives a Glimpse of the Back, and the Internal Arrangement of the Meter

The screen in the foot-candle instrument consists of a strip of clear glass to which

Institution of the Fish Exchange has Been the Means of Saving for Food Purposes Many Tons of Fresh Fish Caught by Outers at Santa Catalina Island

two thicknesses of paper are attached. One of these is fairly opaque and contains a series of uniform perforations. The other is translucent. The screen forms the top of a light box of tapering depth, at the right end of which a miniature electric lamp is installed. In a room of average illumination, the spots at the right end of the screen appear brighter, and those at the left end darker, than their background. Thus, between these extremes, there is a spot that matches the white background. At that point the illumination on both sides of the screen is the same. A reading may be made from a graduated scale printed on the screen, and the actual value in foot-candles determined. The instrument measures from .5 to 25 foot-candles. It is provided with a voltmeter and rheostat so that the lamp may be operated at the required voltage to supply the proper illumination to the photometric screen at all times.

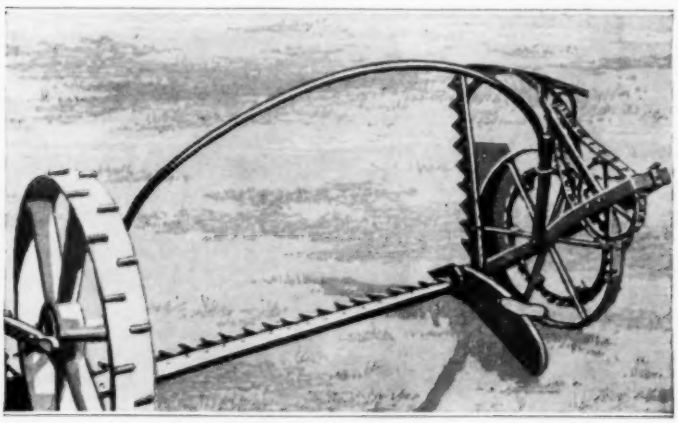
¶ Favorable consideration is being given in many quarters to the use of cadmium as a substitute for solder, what is said to be the best composition being one containing 80 per cent lead, 10 per cent cadmium, and 10 per cent tin.

FISH EXCHANGE AIDS FOOD CONSERVATION AT RESORT

Through the service rendered by a coöperative fish exchange maintained at Santa Catalina Island, the great quantities of fish caught by California tourists and outers are no longer wasted. Not so very long ago it was a common practice for amateur anglers to bring ashore boatloads of fish, have their pictures taken alongside, and then take the catch out to sea and dump it. The fish, in the meantime having died from being out of the water, were thus inexcusably wasted. The Food Administration has prohibited this practice. The fish exchange is the result. Those in attendance are deputized to confiscate and sell in the open market fish that cannot be used by those who catch them. In addition to this, a convenient practice is observed. If, for instance, a person catches at the outset of a vacation period a fine yellowtail, he surrenders it at the exchange and is given a receipt. When he is ready to leave the island, a week or so later, presentation of the check entitles him to another fish of the same size and kind, that has been caught that day and placed on ice.

VERTICAL SICKLE HELPS CUT MATTED GRAINS

A new type of sickle which can be mounted at the outer end of the horizontal sickle of any type of mower or reaper, has been designed for harvesting crops that are matted on the ground, or tangled. It is operated by a chain and cogged wheel connected with a larger wheel at the outer end of the main sickle, an arrangement that relieves the latter of any additional strain. The cut of the vertical knife saves the use of an extra man to clear the gears, which otherwise clog. It is claimed that the large quantities of grain, etc., now allowed to lie uncut, can be saved by using this attachment.



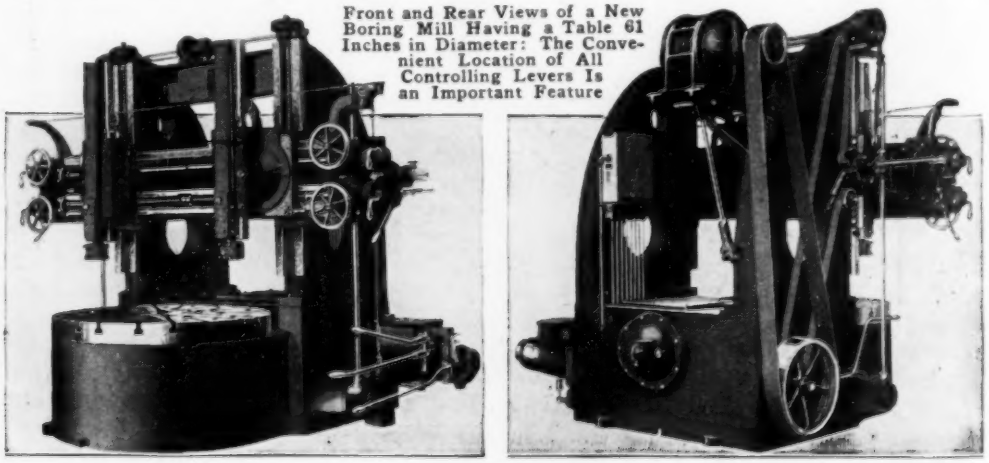
Mower Sickle with a Vertical Sickle Attached at Its Outer End for Cutting the Swath Clear from the Rest of the Grain in Cases Where the Crop is Tangled or Matted

GERMANY HARD PRESSED FOR ADHESIVES

Adhesives are among the long list of commodities which are becoming increasingly scarce in Germany. This is revealed by the fact that the papers contain numerous advertisements for glue, etc., the statement often being made that it is wanted for army orders. It is reported that no more animal glue will be released to civilian makers of shoes, except a small quantity for making artificial sole leather. Because of the general shortage of dextrin and gum arabic, efforts have been made to produce substitutes with juices extracted from certain creeping plants and bulbs.

BORING AND TURNING MILL WITH SPECIAL FEATURES

Well tested, standardized parts have been combined in a new boring and turning mill, having distinctive features, capable of taking work up to 63 in. in diameter and 52 in. high under the cross rail and tool holders. The machine is belt-driven by a 15-hp. mo-



Front and Rear Views of a New Boring Mill Having a Table 61 Inches in Diameter: The Convenient Location of All Controlling Levers Is an Important Feature

tor, mounted on a bracket at the rear. The transmission is similar to that of an automobile, except that the clutch and brake are operated by the same lever, giving instantaneous control from either side. The flow of lubricating oil is continuous and it is doubly screened and filtered as it passes through the machine. The oil used in the cutting-lubricant system is kept absolutely separate from the other oil, a steel pan, steel floor plates and guards, together with a pump and an adjustable conductor for the lubricant, forming a unit into which the machine is set.

WATER WHEEL TURNS PHOTO-PRINT WASHING MACHINE

For washing photographic prints, a novel machine of apparent efficiency has been devised. It consists essentially of a cylindrical wire cage encircled at the middle by a series of cups and pivoted in a rectangular tank. A thin stream of water directed into the cups by a curved spout causes the cage, which holds the prints, to revolve. The arrangement keeps the water thoroughly agitated and the prints separated.

MOTOR-CAR FEATURES SEEN IN NEW MOTORCYCLE

By adapting motor-car designing to a motorcycle, an inventor has developed another two-wheeled conveyance of the open-cradle type. Elimination of the conventional loop frame is a feature that appeals to many riders, and while not an untried idea, it is admittedly one that has certain advantages. The new machine mounts a single-cylinder motor that is fed from a fuel tank carried on the front fender. The wheelbase of the machine is long, and its center of gravity low. The usual type of front fork and its weaknesses are absent. The wheels are fitted with disks, which reduce air resistance and add style to the machine.

With a Heavy Frame Like That of a Motor Car, a Long Wheelbase, and Low Center of Gravity, This Motorcycle Embodies Points That Are Interesting to Cycle Enthusiasts

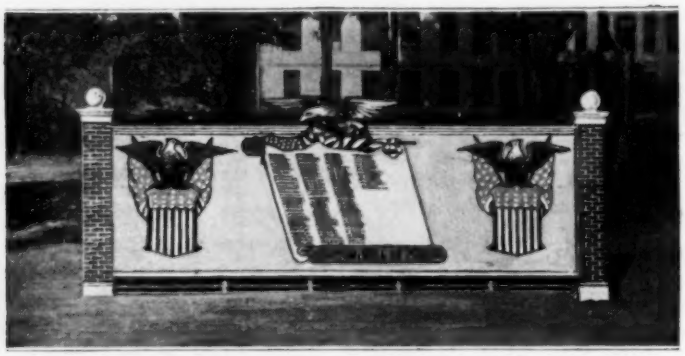
MEN'S BIRTHDAY CAKE HAS GREETING FOR KAISER

The friends of two chums whose birthdays fall on the same day as the German kaiser's paid their "respects" to the latter in no uncertain terms on the occasion of the young men's last anniversary. At the celebration, in which all shared, the two chums were presented with a large frosted cake bearing the following inscription in embossed letters: "Congratulations Herbert and Harry. Jan. 27, 1918. To Hell with Bill."

Frosted Cake Presented to Two Young Men Whose Birthday Falls on the Same Date as the German Kaiser's

ROLL-OF-HONOR BOARD FOR HEROES' NAMES

A roll-of-honor board of distinctive design has been erected in Groton, N. Y., as a record of the men from that town who have joined the colors. It is supported at either end by two ornamental brick pillars. Occupying the



A Roll-of-Honor Board of Distinctive Design, with the Names of the Soldiers So Arranged That the List can be Added to as Desired

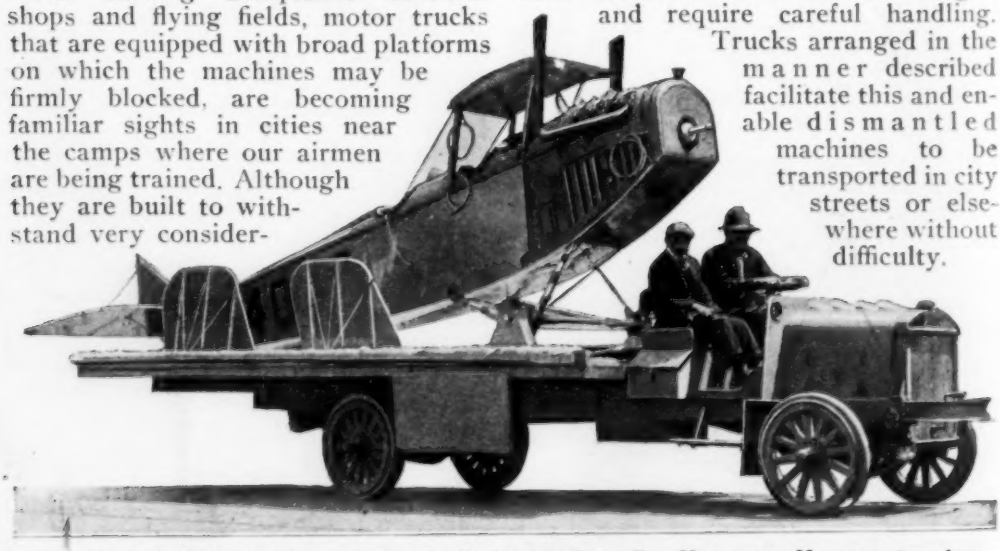
center of the board is a representation of a scroll on which the names are inscribed. Above it perches the American eagle upon a draped flag, flanked on either side by red, white, and blue shields, each of which is also surmounted by an eagle.

TEMPERED STEEL SOFTENED BY SIMPLE PROCESS

From Switzerland comes a description of an interesting new method of detempering steel. The piece to be unhardened is laid on an iron plate that is at red heat. It is covered with a cold plate of iron and left until the whole has cooled. It is then found to be completely softened, regardless of its previous degree of hardness, and may be worked easily. Decarburization or other changes in the quality of the steel do not take place, and furthermore, shaped pieces of steel do not show any shrinkage. The method is specially adapted for unhardening punches and dies.

TRUCK FITTED FOR MOVING AEROPLANES

For carting aeroplanes between shops and flying fields, motor trucks that are equipped with broad platforms on which the machines may be firmly blocked, are becoming familiar sights in cities near the camps where our airmen are being trained. Although they are built to withstand very considerable stresses, air craft are fragile and require careful handling. Trucks arranged in the manner described facilitate this and enable dismantled machines to be transported in city streets or elsewhere without difficulty.



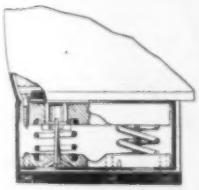
New Air-Craft-Carrying Automobile Truck: It Requires But a Few Moments to Mount an Aeroplane Body Securely to the Truck Platform, Which is Specially Outfitted for the Purpose

CONCRETE SHIPS NOT PROOF AGAINST HUN TORPEDOES

In some quarters the impression that reinforced-concrete ships are better suited than steel vessels for resisting torpedo attack has apparently taken root. The belief is an erroneous one. Concrete vessels have thin hulls that are as susceptible to injury as steel and wooden ones. It is true, however, that one of the new 7,500-ton ships may remain afloat after two of its compartments have been pierced, but that, of course, will depend on the damage sustained from the torpedo. The life span of concrete ships yet remains to be determined. Corrosion of the reinforcing members and cracks in the concrete are the two destructive elements against which preventive measures are needed.

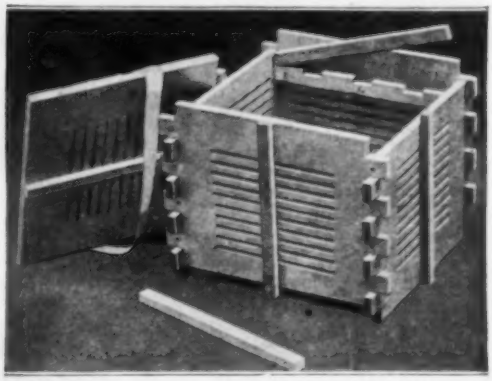
CONCEALED SPRINGS MAKE NEW HEEL RESILIENT

Pedestrian users of hard city pavements will be particularly interested in a new resilient heel designed to serve the same purpose as a rubber heel, but which, it is claimed, will not wear down at the edge. Concealed within it are one or more coil springs inclosed in telescoping metal cases, attached to the shoe proper and the tread. These springs yield slightly under the force of each footfall, thereby relieving the walker of the jar that is constantly recurring when hard heels are worn.



CONTAINER FOR SHIPPING BEES BY MAIL

The Post Office Department having recently ruled that bees can be shipped through the mails, a wooden container has been placed on the market, especially designed for the purpose. The four corners of the case are dovetailed, and in the top and four sides are several slits, ⅛ in. wide, through which the bees can get air but which are not large enough to permit their escape. The cover is easily removable so that the bees can be quickly released when they reach their journey's end. It is anticipated that crates of this character will be in considerable demand, for many bees in the North did not survive last winter and efforts are being made to restock many depleted apiaries, the market for honey being remarkably good at this time on account of the scarcity of sugar.

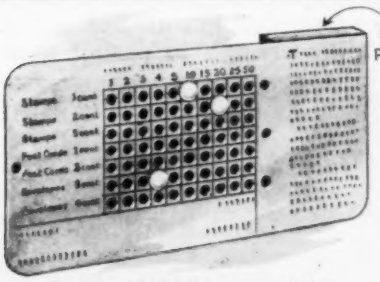


A Recent Postal Regulation Permits the Shipment of Bees by Mail, if Properly Crated, a Ruling Which This Container is Designed to Conform with. The Slits Are One-Eighth Inch Wide

CLUBS OF PARIS POLICE FITTED WITH LIGHTS

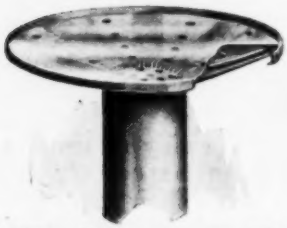
Air raids having made it necessary to keep the streets of Paris dark much of the time at night, the police in that city have been provided with clubs, in the side of each of which a flash light is incorporated. With his weapon improved in this way, an officer can control traffic and perform his other duties much easier than when working in almost total darkness.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



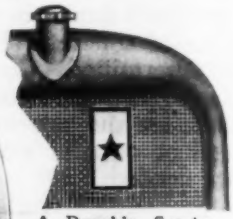
Pasteboard Indicator Enabling Farmer to Order Postal Supplies from Rural Carrier by Plugging Perforations, Putting Money in Coin Receiver, and Placing Card in Mail Box

Elongated Reading Glass Which Magnifies Height, but Not Breadth, of Letters: It Permits a Whole Line of Type to be Read without Shifting Glass, Which is Supported at Proper Focal Length by Legs

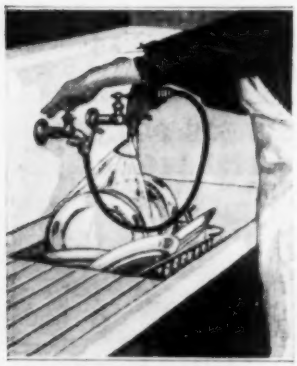


When Fitted over the "Simmering" Burner of a Gas Range, This Device Distributes the Heat So That It is Not Concentrated in the Middle of the Cooking Receptacle

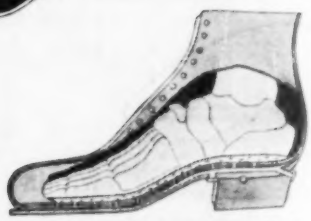
Pocket-Sized Filter That may be Used as Shown, or Employed as a Siphon Filter: The Filter Stone, Rubber Tubing, and Glass Nipple Fit in an Aluminum Case Illustrated in the Oval. Price $2.50



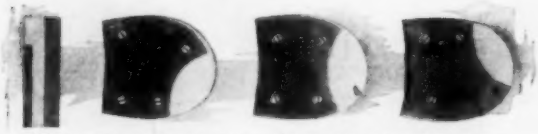
A Durable Service-Flag Ornament, Enameled on Steel, for the Radiator of the Motor Car. Price 50 Cents



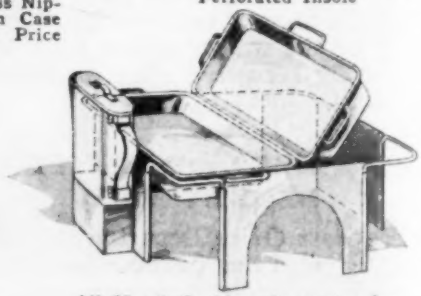
The Fan-Shaped Nozzle Enables Hot Water to be Directed against Dishes with Sufficient Force to Clean Them without Use of Cloth or Soap. Price $2.00



Ventilated Shoe with Resilient Arch Support: Air is Admitted through Valves at Heel and Sides, and Reaches Foot through Perforated Insole



Different Styles of Rubber Inlay for Shoe Heels: A Thickness of Rubber is Placed between Two Layers of Leather and Exposed Only at Point of Contact, as Shown at Extreme Left. Purpose Is Conservation of Rubber and Provision of Nonslipping, Resilient Heel

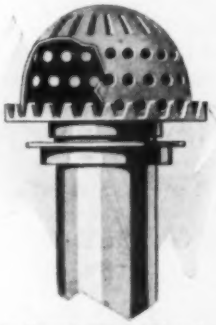


All-Metal Cooking Apparatus for Camp Use: The Parts are Arranged to be Folded Compactly for Carrying. Pans Supported at Top are Provided with Grips to Facilitate Handling

The Movements of the Porch Swing are Controlled by the Foot Rail. Pressure against the Latter will Stop the Motion of the Seat, or Cause It to Swing, at Will

Convenient Metal Fastener for Clothesline, Which Enables Rope to be Firmly Anchored in a Moment's Time, and as Easily Removed When Desired

Folding Rocking-Chair of Simple, Durable Construction Which Is Particularly Suited for Camp or Porch Use: It Occupies Only a Small Amount of Storage Space



The Guard, When Fitted over the Mouth of a Roof Drain, Prevents Gravel from Entering the Pipe and Eventually Clogging the System

For the Soldier: A Smooth-Surfaced Writing Board Made of Fiber and Held in Position by Clamping to an Elastic Band Encircling the Leg, as Shown in Square. The Board Has a Pocket That Accommodates Several Sheets of Paper and a Few Envelopes

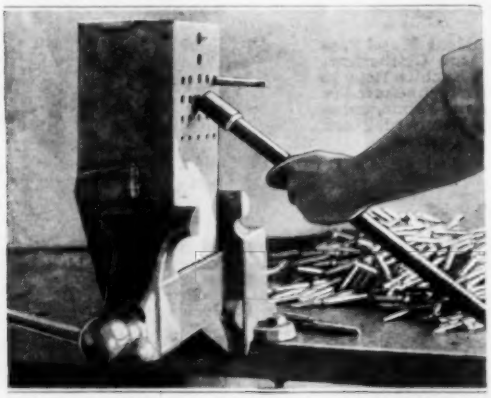
Wooden Tongs Permit Clothes to be Removed from Boiler or Hot Rinsing Water without Danger of being Dropped

Fuel-Conserving Cooker for Top of Stove: Even Distribution of Heat Makes Device Especially Suited for Baking and Roasting

The Fire Clay in the Front of This Gas Grate Heats to Incandescence So That, as in the Case of the Gas Mantle, No Flame Is Visible. Splendid Combustion Enables the Apparatus to be Used without Filling a Room with Noxious Fumes

SAFETY BOX FOR BREAKING WORN-OUT DRILLS

The breaking of worn-out steel drills, or other bars of scrap metal so that the portion of high-speed steel can be kept separate from the softer metal, is not accompanied by danger due to flying particles when the device shown in the illustration is used. This consists of a container, one side of which is made of ¾-in. metal having holes of various diameters drilled in it. This box is clamped into a vise, and after the old drill has been inserted in one of the holes, it is broken in two by using a pipe, slipped over the projecting end, as a lever.



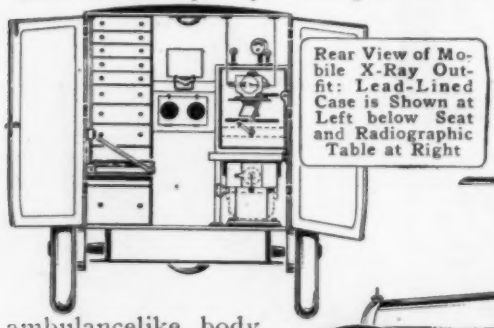
To Avoid the Danger Due to Flying Particles of Steel, Worn-Out Drills to be Broken are Inserted in the Holes in This Box and Then Snapped in Two with a Pipe, as Shown

CANADA ESTABLISHES PARK SOUTH OF DETROIT

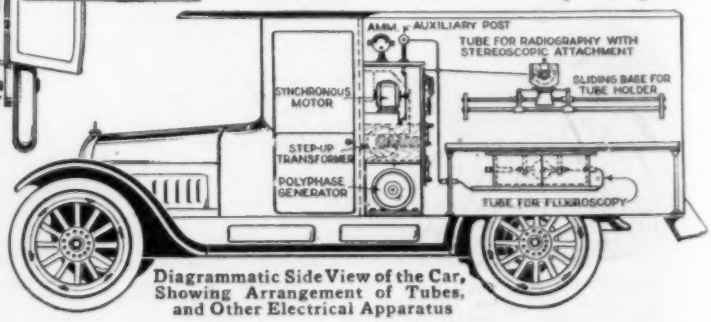
A portion of the Dominion of Canada, which, many will be surprised to learn, lies almost directly south of Detroit, Mich., has been made a national park by the authorities at Ottawa. The tract set aside is known as Point Pelee, and is the southernmost land in the dominion. It projects nine miles into Lake Erie and includes several square miles of marsh. The principal reason for making this region a national park is that at certain seasons birds in great variety and numbers gather here, it being a concentration point in their flight northward and southward.

MOTOR CAR CARRIES X-RAY PLANT FOR ARMY WORK

For use at emergency operating stations in the field, a mobile X-ray plant has been compactly arranged in an ambulancelike body carried on a motor-car chassis. A 2-kw. direct-current generator, driven by the automobile engine, supplies the current. The radiographic table, arranged to be tilted 90° on its horizontal axis, is supplied with an automatic tray and cassette into which plates may be inserted from the side. An X-ray tube, supported above for radiographic work, may be adjusted longitudinally or vertically, while the one beneath the table, for fluoroscopic work, may be moved lengthwise. An instrument case, a lead-lined cabinet for unexposed plates, and a dark-room compartment for photographic development, are provided.



Rear View of Mobile X-Ray Outfit: Lead-Lined Case is Shown at Left below Seat and Radiographic Table at Right



Diagrammatic Side View of the Car, Showing Arrangement of Tubes, and Other Electrical Apparatus

On the wall opposite the table is an upholstered folding bench that may be used as a berth. The motor, generator, and transformer are mounted behind the switchboard at the front end of the body. The equipment is so arranged that without much difficulty it may be moved into a house or dugout and operated through cable connection with the car.

OSTRICH MEAT PLENTIFUL IN ARIZONA

The owner of a large ranch in southern Arizona, having determined to abandon ostrich raising in favor of cultivating long-staple cotton, recently decided to butcher 800 of the large birds and sell the meat—approximately 25,000 lb.—to the people of the surrounding region. It is estimated that a few years ago there were 8,000 ostriches on ranches in this district. More recently, however, large numbers of them have been turned out to roam the foothills uncared for, or have been killed. But for the fact that coyotes and other wild animals are fond of the big eggs, it is thought that there would soon be considerable numbers of wild ostriches in the region.

CYLINDER LUBRICATOR FOR DRY GRAPHITE

A graphite lubricator, recently placed on the market, is so simply constructed as to be fool-proof, it is claimed. Its only movable part is a ball valve beneath the graphite chamber. The lubricator is installed on the steam-chest cover, or indicator pipe, and the difference in pressure during the steam-inlet period causes the ball to leave its seat, allowing graphite to feed into the steam chest and thus gradually through the cylinders.

OUTFIT FOR WALKING ON WATER

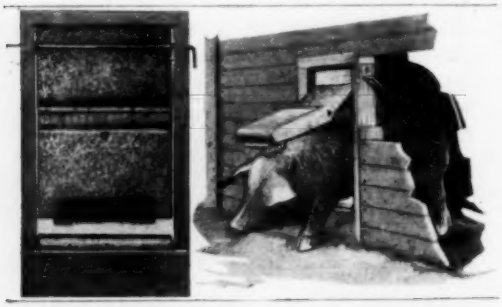
Walking on the water is made possible by the use of a recently patented outfit which is a combination of a balloon and a set of floats. The small gas bag used has a lifting capacity almost sufficient to raise an adult from the ground and it is attached by ropes to a belt worn about the waist of the performer, who also uses a pair of foot boards, each having cylindrical floats fastened to its underside. A hand support, made like the foot boards, is provided with a long handle and is pushed ahead of the walker to aid him in keeping his balance. The wearer of the floats walks with a step resembling that used by a wearer of snowshoes. Beneath the balloon is a canvas-covered ring, with floats attached, which may be used as a life preserver in case the balloon collapses.

An Outfit Consisting of a Small Balloon and a Set of Floats with Which One can Walk on the Surface of the Water with Ease

AUTOMATIC HOG OILER IS ALSO PEN DOOR

One of the newer devices for oiling hogs consists of a metal door that hangs in the hog-pen entrance. It is made in two sections hinged together, the lower of which has perforations in one side and will contain one gallon of disinfecting oil, while at the bottom

is a coarse brush. As a hog pushes through the door, the oil is sprinkled over him and then the brush rubs it

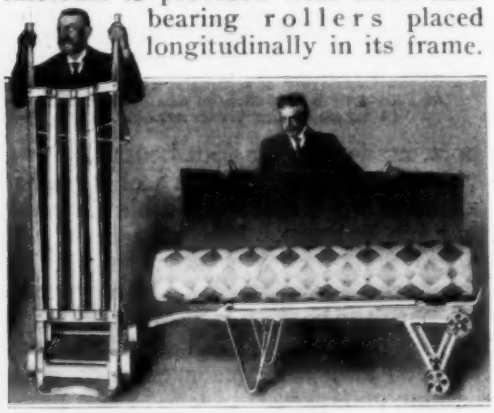


Hog Oiler Which Serves as a Door for the Pen: The Lower Section Contains the Disinfectant Which is Sprinkled on a Hog When He Pushes through the Doorway

into the hide. The under part of the body is oiled by passing over a roller, partly immersed in disinfecting fluid, which takes the place of a sill.

HANDY ROLLERS A FEATURE OF LINOLEUM TRUCK

An improved truck with which one man can easily handle heavy rolls of linoleum is provided with three ball-bearing rollers placed longitudinally in its frame.



The Three Rollers in This Truck are Shown at the Left, While the Manner in Which a Bolt of Linoleum can be Rolled or Unrolled on Them is Illustrated at the Right. Note the Extra Wheels Also

A large bolt of linoleum resting on these supports can be easily unrolled and rolled by one man, whereas with an ordinary truck two men would be required to handle it. Another feature is an extra pair of wheels, making four in all, at the end of V-shaped legs attached at the lower end of the carrier. These four wheels are so arranged with respect to each other that they support the truck in an almost vertical position so that a roll, after it has been loaded, can be moved about without drawing it and the truck over into a horizontal position.

HEAVY WELL CASING SUNK BY FLOATING

The successful sinking, recently, of over 500 ft. of cast-iron well casing, 16½ in. in diameter, is considered as marking an important progressive step in deep-well work. The lowering of such a casing by ordinary methods would not have been attempted because of its great weight, which was 120 lb. per foot, and because cast iron, unlike steel, will not bend to conform to slight deviations in a bore. In this instance the bore was accurately made, and its diameter was 19 in. in the section where this casing was placed. The method employed consisted in filling the drilled hole with torpedo sand and water and resting the pipe on the sand after its lower end had been plugged with a perforated disk. The casing was then allowed to settle gradually by pumping out the sand.

GOVERNMENT CAFETERIAS POPULAR IN ENGLAND

Because the eating places in Great Britain have made unwarranted reductions in the size of the portions served and have also reduced the quality of their foods, the Ministry of Food has established government kitchens and restaurants in several cities. The kitchens were started first, and at the present time there are more than 1,000

CLEVER, ENTERTAINING DEVICES FOR CHILDREN

in operation. With a few exceptions, the food sold at these places is not eaten on the premises, but taken home by the purchaser. A few of them are under the direct supervision of the ministry, but in most cases the national authorities have intrusted their maintenance to local governments, loaning them the necessary capital.

The restaurants were started because many travelers and others were unable to benefit by the kitchens. The first one was opened in London, the original payment for rent and equipment being $12,160. It is operated on the same plan as the American cafeterias and from the outset has been a great success, the only unsatisfactory feature being the delay in reaching the food counters on account of the long line of customers waiting their turn. The prices are considered very reasonable and are about the same as in the average American cafeteria. The foodstuffs used are bought in the open market.

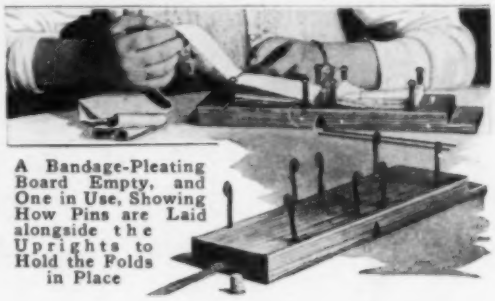
RUBBER MEDICINE DROPPER AND STOPPER COMBINED

A nonbreakable medicine dropper for which many advantages are claimed is made of rubber in the shape of a cork, except that it is pointed at its lower end, and serves as a stopper also. It is hollow and when compressed slightly will discharge a drop of the proper size. Since its place is in the mouth of the bottle it is always ready and is also free from dust or dirt.

As a result of exhaustive experiments dealing with red and infra-red rays, the Bureau of Standards has demonstrated that an invisible long-wave interval, as large as the whole visible spectrum, is accessible to photography if properly prepared plates are used.

BANDAGE-PLEATING BOARD FOR RED CROSS HELPERS

A bandage-pleating board is being introduced among Red Cross chapters which saves time and labor in folding

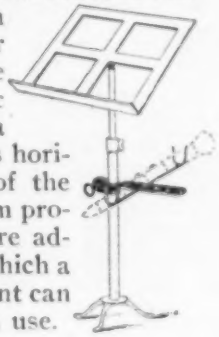


A Bandage-Pleating Board Empty, and One in Use, Showing How Pins are Laid alongside the Uprights to Hold the Folds in Place

the 84-in. bandages included in "trench packets." The center of the bandage is held in position by placing it over two needles projecting upward from the center of the board. Set the proper distance apart either side of the center, are two pairs of screws. The bandage is laid flat along one-half of the board and then a hatpin, or wire, is laid over it, just outside the outer pair of screws, to hold the cloth while it is folded back toward the center, after which a second hatpin is properly placed against the screws next to the center. The folding proceeds in this way until each half has been pleated. Then the folds are temporarily pinned together and the pins removed.

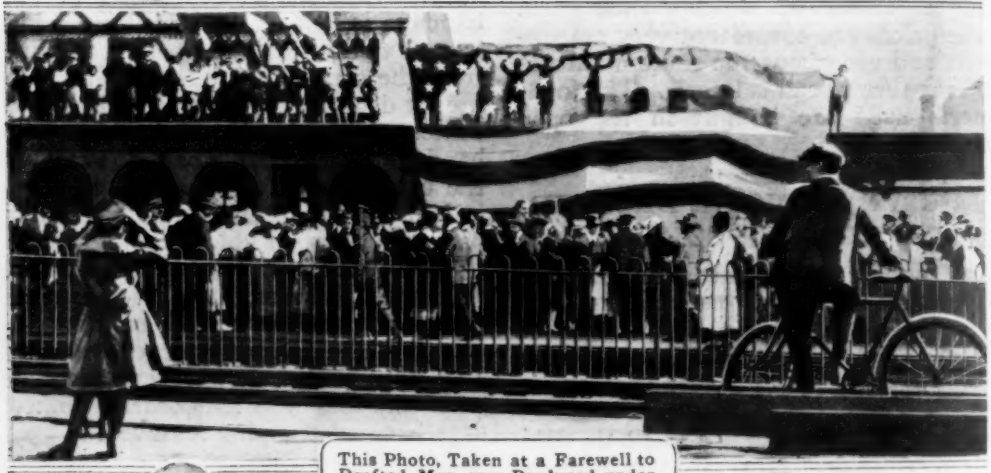
INSTRUMENT HOLDER FOR MUSIC RACKS

An attachment, designed for the convenience of members of orchestras and other musicians, is an instrument holder which fastens to the standard of a music rack. It consists of a main arm that projects horizontally at one side of the upright, and a cross arm provided with two or more adjustable brackets, on which a horn or other instrument can be placed when not in use.

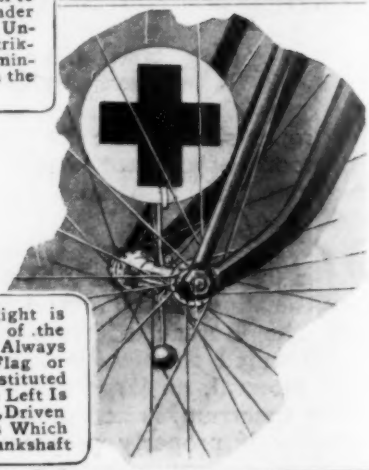


CLEVER, ENTERTAINING DEVICES FOR CHILDREN

A Scroll Saw, Three-Ply Wood, Patterns, and Water Colors, with Which a Child can Make Most Interesting "Action Toys" for Himself and His Friends: A Sample Toy is Shown



This Photo, Taken at a Farewell to Drafted Men, was Produced under Peculiar Light Conditions. The Unusual Picture of the Flag Is Strikingly Symbolical of the Intermingling of "the Boys'" Lives with the Stars and Stripes



The Red Cross at the Right is So Mounted on the Hub of the Bicycle Wheel That It Always Remains Upright. A Flag or Other Insigne can be Substituted for It, if Desired. At the Left Is a New Sort of Hobbyhorse, Driven by Pushing on the Pedals Which are Connected with the Crankshaft

AND BOYS AND GIRLS WHO ARE DOING THEIR BIT

An Organization Which has Demonstrated Splendidly the Large Service Young Folks can Perform for Our Fighters "over There" Is the Junior Red Cross in Parker High School, Chicago. This Is One of Its Surgical-Dressings Classes, Composed of Boys as Well as Girls

A Beautiful Pageant Given at the Chicago Municipal Pier by Junior Red Cross Members to Teach War Economy: Some Children Represented Things to be Given Up, Such as the "Stick of Candy" in the Spirally Striped Suit, and the Little Brown Caramels, Kneeling in the Foreground. Others Represented the Substitutes We at Home should Use

This Group, Also from the Parker High School, is Composed of Boys Entirely, Except the Instructors, and They have Proven Just as Good Bandage Makers as the Girls. In Addition, They and Other Chicago Chapters have Made Checkerboards, Knitting Needles, Sticks for Swabbing Wounds, and Personal-Property Bags, and have Collected Quantities of Tin Foil

SAFETY STRIPS FOR WALKS ON STEEP HILLSIDES

Numerous streets in a western city extend up hillsides so steep that special precautions have been taken to

Steep Concrete Walk with Safety Strips Cast in Its Surface to Take the Place of Similar Wooden Strips on the Wooden Walk Which It Displaced

render the sidewalks safe for pedestrians. In earlier days when the walks were of wood, extra strips were nailed across them to provide a secure footing. When concrete was substituted for the wood, the same type of raised strip was employed, but made of concrete cast with the rest of the walk. The result is a permanent safety feature that prevents slipping and makes walking easier. The additional expense involved in finishing the walks with these strips is comparatively small.

AMERICA CHIEF PRODUCER OF ALUMINUM

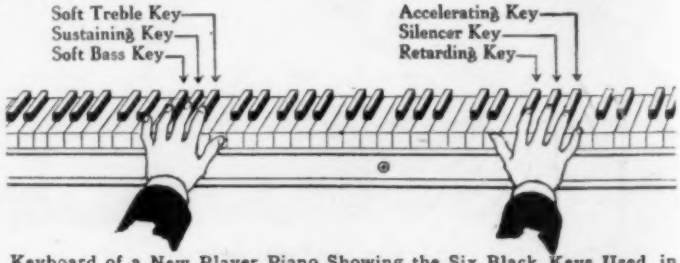
In 18 years the amount of aluminum produced in this country has increased from 7,000,000 lb. to more than 180,000,000 lb., making the United States the largest producer of this metal in the world. Its output is approximately half that of the entire world. There is special significance in this fact because aluminum is being used increasingly as a substitute for tin—a metal which America has been compelled to import in large quantities because little, if any, is to be found in this country.

At the present time the aluminum produced is used largely in aeroplanes, automobiles, helmets, and cartridges. Bauxite, the mineral from which most of it is obtained, is found in large quantities in Kansas, which at the present time is a principal source of the raw material, though it is to be found in many other parts of the United States.

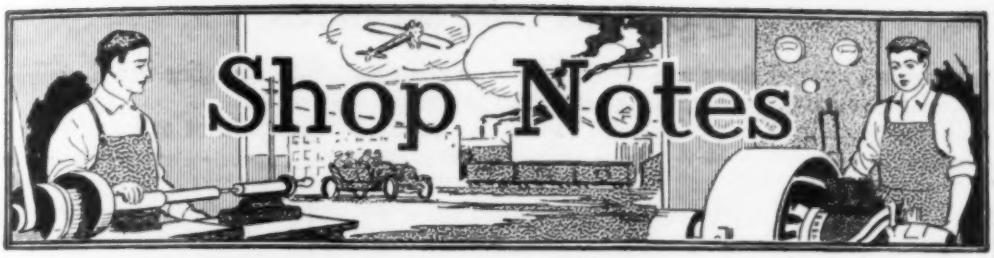
¶The section in the recently passed river and harbor bill providing for the deepening of Hell Gate Channel to 40 ft. means that eventually New York will have two water outlets instead of one—an improvement of great importance in peace times as well as in war.

PLAYER PIANO CONTROLLED BY SIX BLACK KEYS

A special feature of a player piano of new design is the absence of the usual sets of levers, stops, or buttons, for controlling the expression when pieces are rendered mechanically. This instrument is so constructed that six of the black keys—three on the left and three on the right—furnish the means of control. When the piano is to be played mechanically instead of manually the keyboard is made inoperative by moving a lever concealed beneath it. The same operation connects the six black keys with means for accelerating, retarding, etc., it being only necessary to press the proper key to get the desired effect.



Keyboard of a New Player Piano Showing the Six Black Keys Used in Controlling the Instrument in Place of Levers or Buttons



How to Make a Sanitary Kitchen Cabinet

By S. R. WINTERS

THE modern discovery that saving of steps can result in a vast increase in human efficiency has found its way into the kitchen chiefly in the form of the modern kitchen cabinets. These are built with the idea of making it possible for the housewife to have nearly all the materials and tools which she needs kept together in one place, systematically arranged, so that they can be found without loss of time, and used without being carried across the kitchen. The cabinet should therefore be placed very close to the range, a good position being that shown in the lower photograph.

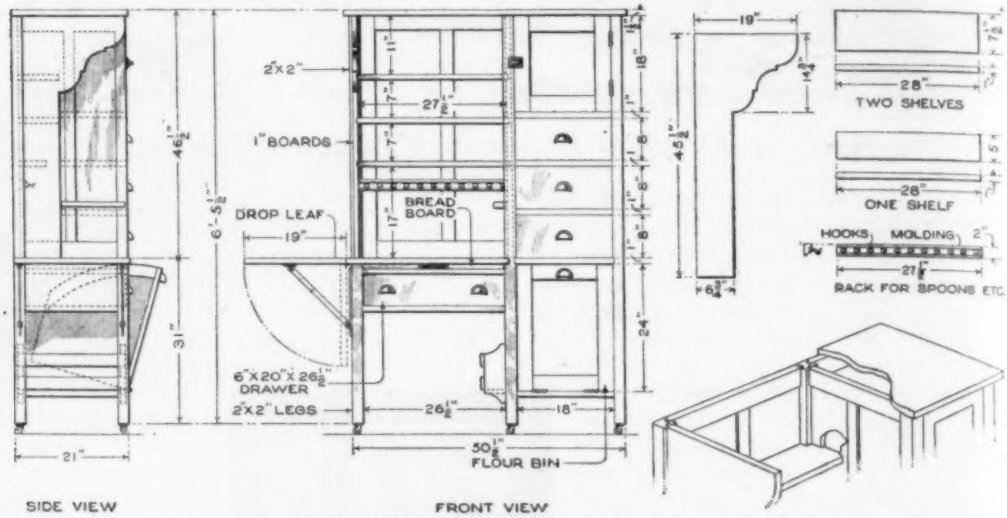
A Homemade Kitchen Cabinet, Placed near the Range, Saves the Housewife Much Time and Many Steps

The construction of the cabinet is evident from the two photographs and the working drawings on the next page. Almost any kind of wood will do, if it is well-seasoned and reasonably clear. The cabinet is 6 ft. 5½ in. high, from the casters to the top of the closet, and 31 in. to the top of the table; it is 21 in. deep and 50½ in. wide. The part below the table contains the flour bin, a large drawer, rack, and dough, or pastry, board. The bin is fastened to the frame with loose-pin hinges, so that by removing the pins the bin can be taken out, cleaned, and replaced. The bin can be lined with tin to make it free from moisture, insects, and rats. The bread board is made of wood that is tasteless and odorless, and fitted in the opening just below the table. A batten is tongued and grooved on each side of the board to prevent it from warping. The roomy drawer can be used for small utensils. The open space below the drawer is a good place to keep the kitchen stool, or the fireless cooker, when not in use. Pie pans, lids, and covers have a convenient place in the rack below the drawer. A drop leaf, or folding shelf, 21 in. wide and 19 in. long, increases the table surface; it is supported by inexpensive folding brackets.

The upper part of the cabinet consists of a closed compartment, three drawers, three open shelves, a knife rack, and a row of screw hooks for hanging kitchen utensils. The closed compartment is for package goods and large utensils; the drawers are inviting for depositing kitchen linen, package goods, and other things needed in daily use. The lower shelf is 5 in. in depth,

while the upper shelves are 7½ in. On these shelves are kept coffee, tea, sugar, and spice jars, and canned goods. Three inches below the lower shelf there is a strip, 1½ in. wide, which holds screw hooks on which are hung strainer, measuring cup, and other small conveniences.

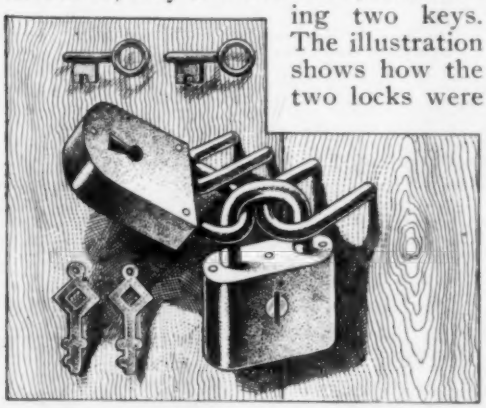
To make the cabinet attractive and easily cleaned, it should be finished with two coats of white paint and one coat of white enamel.



Construction of the Cabinet: Shelves, Hooks, Drawers, and Compartments are Provided for Almost Everything Required in the Kitchen

Four Men Use Two Padlocks on One Door

Four men wished to lock a door in such a way that any one of them could unlock it; they had two locks, each having two keys. The illustration shows how the two locks were combined to serve the purpose. Each man unlocks whichever lock his key fits, and the door can be opened. When he has finished, he closes his own lock on the staple; if one of the men carrying the other kind of key is using the locker at the same time, the door is left open until he has finished, when he closes his lock through the other one.—Ernest Schwartz, Brooklyn, New York.



By Closing the Two Locks into Each Other, Four Men, Although Carrying Different Keys, Have Access to the Same Locker

Counterweights on Portable Drills and Other Heavy Tools

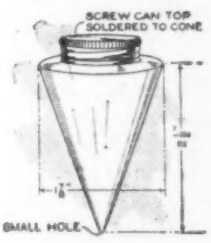
In a factory where a careless operator had allowed an expensive electric portable drill to roll off the bench and become ruined, similar drills were suspended by sash cord from 2½-in. iron pulleys held up with 1-in. screw eyes. The other end of the cord carried a counterweight, which just balanced the drill at any height. A knot was tied in the cord above the drill to prevent its getting out of reach when raised. The cord was attached to a band, bolted around the drill at its center of gravity, so that it remained suspended horizontally.

Using Hacksaw Blades with Broken Teeth

When a hacksaw blade loses some of its teeth, grind away the teeth at each side of the damaged portion, in a slanting direction, so that the stubs of the broken teeth can slide over the work without breaking, and the remaining good teeth can do the cutting. This process will often enable the workman to finish a job which might otherwise be held up.

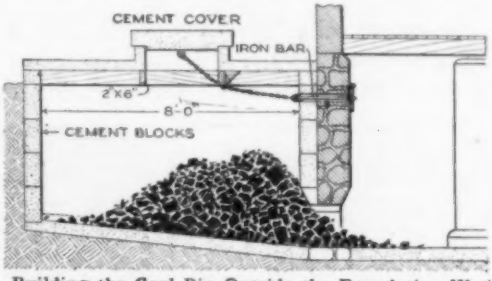
Cone Container Conserves Powdered Emery

Those who use emery dust for grinding valves and joints, and for similar purposes, will find the container shown in the sketch a useful tool. It is made by soldering a 1½-in. screw can top to a cone formed of tinned sheet iron. Emery may be sprinkled out through a small hole at the apex of the cone. The diameter of this hole should be proportioned in accordance with the fineness of the emery powder used. Thus the exact amount of dust required can be applied to the surface which is to be ground.—J. R. Minter, Washington, Ind.



Outside Coal Bin Provides Convenient Storage

Many householders are prevented from laying in an early coal supply by the smallness of their coal-storage capacity. When space in the basement is scarce, a coal bin built just outside the foundation wall becomes desirable. The one illustrated was built of cement blocks, with a cement roof just above ground level, supported by wooden rafters. A heavy stone cover, which need only be removed for receiving coal in the bin, provides considerable security against theft of coal, and if greater security is desired, it is only necessary to attach a chain to the bottom of the cover and fasten it through a hole in

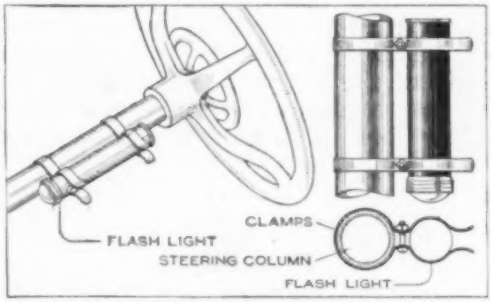


Building the Coal Bin Outside the Foundation Wall Keeps the Coal Safe and Handy and Saves Cellar Space

the basement wall. The floor of the bin should slope toward the opening, from all directions, so that the last shovelful of coal will come into position when needed. From 40 to 45 cu. ft. of space should be provided for each ton of coal to be stored.—Richard Chambers, Lynbrook, L. I.

Flash Light on Automobile Steering Column

To keep the flash light handy where it will not get lost, and at the same time have a dash, or speedometer, light, it is only necessary to fasten the flash light on the steering column, as shown in the illustration. The light can be removed instantly from the spring clamps, which are made of pieces of an old clock mainspring, or any other pieces of thin spring steel. The screw holes may be punched

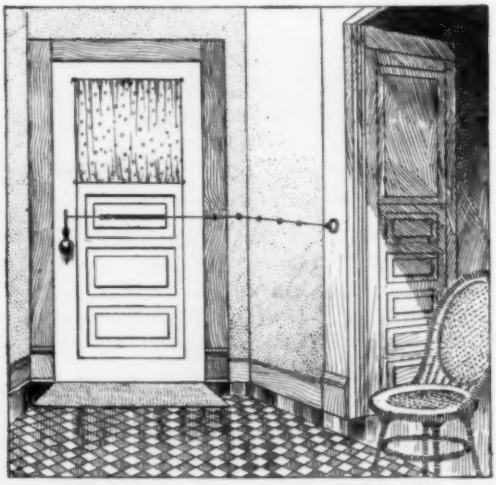


A Flash Light Attached to the Steering Column Provides a Dash Light and Trouble Light in One

through the spring steel, or it may be annealed and retempered after drilling the holes.

Door Latch Controlled from Kitchen Saves Many Steps

In many city apartments there is a long private hall with the entrance door at one end, and rooms all along



A Cord Attached to a Lever on the Door Knob will Save Much Time in Many City Flats

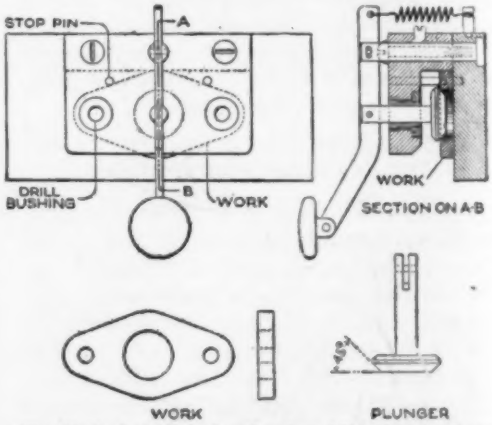
it. Usually the kitchen is at the end of the hall. Many tedious steps to answer doorbells can be saved by means of a steel wire attached to the door knob, running through screw eyes placed in position for the purpose, to the outside of the kitchen door. A handle is then attached to the wire, by pulling on which the door knob may be turned and the door opened when the bell is rung. The door is best provided with spring hinges to close it, and a weak spring may be placed around a section of the cord to take up the slack, the ends of the spring being attached at the proper places on the cord to insure doing this. The cord is drawn taut when in use.

Fitting Bearing Adjustments Accurately

Refitting main bearings and connecting rods sometimes brings the slots in the castellated nut out of line with the cotter-pin hole in the bolt. The safe and sure way is to fit the nut to the new position, rather than to use "dutchmen" in the form of liners. Note how far the slot on the nut comes out from the hole in the bolt, and dress down the flat side of the nut with a file. A few rubs with a good file will make the nut fit in a workmanlike manner.—W. H. Thomas, Cedar Rapids, Ia.

Wedge-Clamp Jig Helps Speed Up Production

Holes in small, thick pieces must be drilled rather than punched for accuracy, even when produced in large numbers. Much of the cost of drilling is represented by the time necessary to clamp the part securely in the jig, so that the holes will be accurately placed. The jig illustrated enables the piece to be inserted as rapidly as in a punch-press die. In the piece to be drilled, the dimension to be made accurate was that between the two small holes, the center hole being left rough. Instead of having an ordinary jig, where the part must be laid between gauge pins and lifted out vertically when it is finished, the piece is merely shoved in on a flat surface against stop pins, and is clamped down by a lever operating a wedge-shaped plug which fits the center hole. The lever



The Method of Clamping Employed Enables the Operator to Insert and Remove the Piece Much More Rapidly Than in the Conventional Jig

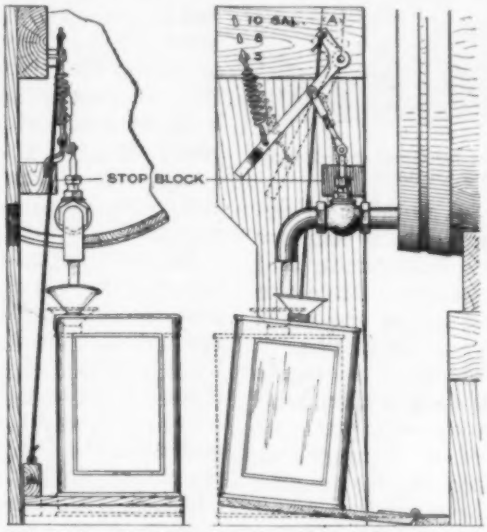
can be operated by the left hand as the drill-press lever is worked with the right.—John Havekost, New York, New York.

Automatic Shut-Off for Filling Cans or Buckets

By J. C. WINTERBURN

MANY gallons of gasoline and oil are wasted because cans are filled too full, and overflow. It is not difficult to make a link motion to operate the valve, which will save both the liquid sometimes wasted and the time and care constantly required to keep from wasting more.

The valve is an ordinary globe, or pressure, valve, the stem of which has had its threads filed down smooth, handle removed, and packing renewed. In place of the handle is fastened an adjustable link, which consists of a bolt with flat head, screwed into a threaded tube which is also flattened and drilled at the other end. The other link is made of a stiff scrap of sheet steel, shaped as shown; one end is fastened to a coil spring, and from the other a cord or wire extends down to the hinged platform, on which the can to be filled is placed. Any number of hooks or nails may be provided on which to hang the springs, each one corresponding to a certain number of gallons of the liquid to be drawn. The position of these hooks can best be found by experiment, pouring a measured amount of liquid into the can, and then finding the point where the spring must be attached to make the valve close as soon as that amount of liquid is in the can.



When the Liquid in the Can Reaches the Proper Height, Its Weight Works the Toggle-Joint Linkage, Closing the Valve

The action is as follows: Place the empty can in position, and attach the spring to the proper hook, thus opening the valve. No more attention is then required; whenever the proper amount of liquid has flowed out, its weight pulling on the cord overcomes the pull of the spring, straightens out the toggle joint formed by the links, and thus closes the valve. Before removing the filled can, the spring must of course be detached from the hook; the weight of the platform is then sufficient to hold the valve closed.

Several points must be borne in mind when proportioning the various parts:

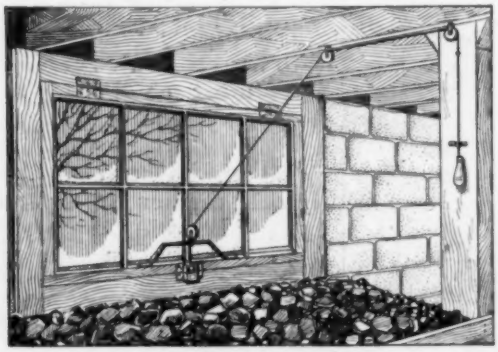
The lower end of the cord should be attached much farther from the hinge on the platform than the upper end is from the link pivot, so as to reduce the amount of motion of the platform; otherwise too large a funnel will be required, or the liquid may spill.

The lever to which the spring is attached should be made long, as shown, and a long spring should be used, but weak and flexible enough so that it will have to be stretched in attaching it to any of the hooks. If this suggestion is followed, and the link is shaped so that the end to which the cord is attached makes an angle of about 45° with the cord, then the valve will close suddenly as soon as the proper weight is reached by the liquid in the can. Otherwise, as the platform swings down, the increase of the lever arm A, tending to close the valve suddenly, will be overcome by the increased pull of the spring, and the valve will close only partly until sufficient liquid flows in to close it entirely.

The length of the adjustable link must be made such that the valve will be closed tight as the end of the long link strikes the stop block.

Timesaving Device to Open and Close Cellar Windows

When the coal bin in the cellar is well filled with coal, it is often troublesome to get at the cellar window above



A Very Simple Arrangement for Opening and Closing the Window over the Coal Bin

in order to close it. A number of devices for controlling such a window from a distance have been made and described, but most of them have the disadvantage of being either too complicated or too inconvenient in use.

The one here illustrated is made from three pulleys, a cord with a handle on its end, and an old piece of strap iron. The cord is fastened, as shown, to the spring latch usually found on cellar windows, and extends at an angle toward the place from which the window is to be controlled. As will be seen, a pull on the handle first unlatches the window, then pulls it open, and holds it so by means of the catch and the knot in the string. When the window is to be closed, the cord is released, and the window slams shut. If the hinges work hard, or the window is too light to latch itself without pressure, a weight may be attached to the inner side of the window.

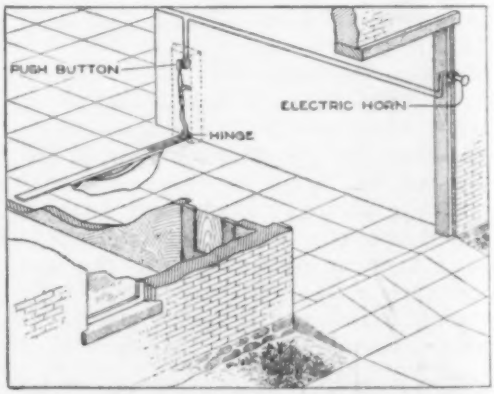
Clogged Spout Readily Cleaned with Hose

If the spout leading down from the eaves trough becomes clogged with leaves, and a water hose is handy with sufficient pressure, the pipe may be easily cleaned out thus: Remove the nozzle from the hose, and insert the hose at the top of the clogged pipe spout. Turn on the water, and as the dirt is driven out at the top or bottom, work the hose down until the pipe is clean.—James H. Beebee, Rochester, New York.

Car Leaving Garage Automatically Gives Warning

The plan of having an electric automobile horn placed in the entrance of a garage to notify pedestrians that a car is about to cross the sidewalk is not a new one, but the operation of the horn usually depends on the memory of an employe. Link motions for doing this automatically can, of course, be built in many different ways, but are likely to give trouble from being too complicated, from failure to work at the right time, or a possibility of working at the wrong time.

In the illustration, a long lever is set into the cement floor across the garage exit, having underneath it a strong spring, so that it cannot be depressed by the weight of a man anywhere upon it, or by the weight of a car, except as a wheel crosses its outer end. The end near the hinge is sunk flush with the floor. A simple link motion pushes a button which connects the horn either



A Well-Arranged and Strongly Supported Floor Lever Makes Practicable an Automatic Arrangement for the Garage Entrance

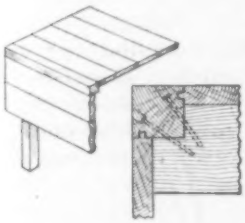
to a battery of dry cells, or to the 6-volt testing mains, which are available in many garages.

Old Piston Used to Polish Rebored Cylinders

When an old automobile or gas-engine cylinder has been rebored for the use of new pistons, the old pistons may be made use of to lap out the cylinder before fitting in the new ones. Split the old pistons in half, and place expanding wire springs on the wrist pin, so as to force the halves of the piston apart; then work them through the cylinder with oil and fine emery, finishing with pumice.—H. G. McQueen, Dow City, Iowa.

Removable Heavy Edge for the Bench

The weak part of a carpenter's workbench is the upper edge of the working side, particularly where the vise works against the side, and the upper part, if the bench must also serve as vise jaw. The edge wears away rapidly, and to renew it means considerable trouble, without the satisfaction of permanent relief.

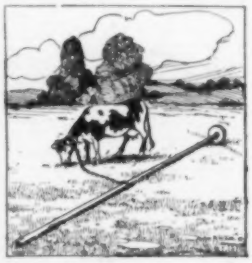


This condition is entirely remedied by the solid edge here illustrated. A solid piece, made from 4 by 4-in. surfaced stock, forms the edge, the side and top being either matched into it, which is preferable, or simply joined onto it. The cleats, or joists, are cut off at the corner and mortised into the edge, as shown at the right, and the edge is fastened to them by spikes, having their heads sunk well below the surface. The heavy edge stays straight and true indefinitely, and does not work loose, because of its heaviness and the fact that the spikes are set into the wood at an angle to the direction of all strains thrown upon it.

A workbench made of soft wood can by this method be provided with a hardwood edge, in which case the edge piece need be of only 3 by 3-in. stock. —Henry Simmons, San Diego, Calif.

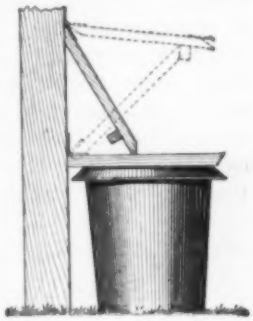
Safety Radial Tether for Animals

To tether a horse or cow so as to admit of its having a large feeding range, and yet so as to be perfectly secure and require no attention, a pole, 20 or 30 ft. in length, is pivoted at one end and fitted with an iron ring large enough to slip along from end to end. The small end of the pole is supported by a light metal wheel from some old farm implement, or a wooden one cut from a piece of plank. The animal is fastened with a halter chain, too short to get tangled up with the animal's legs.—Joseph G. Allshouse, Vandergrift, Pennsylvania.



To Keep Animals from Molesting the Garbage Can

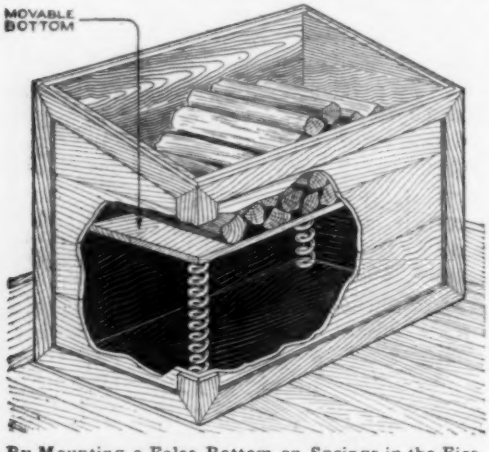
The refuse pail in the back yard is attractive to cats and dogs, and sometimes to rats. Often the pail is thus tipped and the refuse spread on the ground. The contrivance illustrated remedies this condition. The pail is placed near a clothes post or fence; a narrow strip is hinged to the post, level with the top of the pail. A second strip is hinged above the first at about the angle shown.



When both strips are down, the upper one falls and rests on the lower, checking it from being raised unless the upper one is first raised. To release the pail, raise the upper strip; then raise the lower strip to engage the cleat on the upper one.

Self-Raising Box Bottom Aids in Obtaining Contents

Many people are now using wood to save coal. One family eliminated the back-breaking job of picking sticks out



By Mounting a False Bottom on Springs in the Fire-Wood Box, the Wood is Always Kept near the Top of the Box

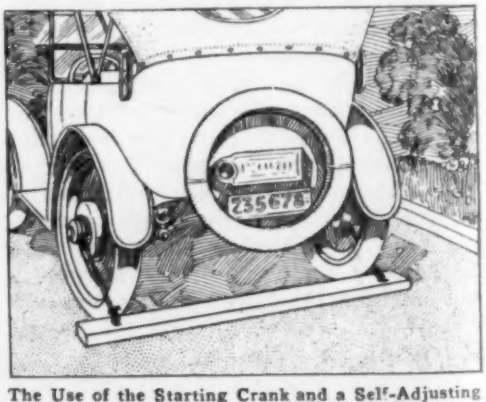
of the bottom of the wood box by putting in a self-raising bottom for the box. Four springs were found and fitted one in each corner, holding up the movable bottom to a height of 12 in. When wood is placed in the box, its weight forces down the movable bottom. When the wood is nearly used, the springs raise the last sticks up so that they can be obtained without great effort. The same arrangement could be used on any chest or box where supplies, such as grain, tools, or coal, are kept in a deep box, thus making it easy to get at the contents.

Draining Pipes in an Unoccupied House for the Winter

When a house stands unoccupied during the winter, it is necessary to see that the water is drained from the pipes as much as possible, to prevent freezing and causing cracks in the pipes and fittings. Any house owner can do this for himself, and save the plumber's bill, if he understands the piping system. First turn the shut-off valve on the supply pipe where it enters the house; sometimes there are two or more of these on branches of the supply pipe. This shuts off all water from entering the house, and allows the water in the pipes to drain out entirely except for a few sections. Flush the toilet and open the sink faucets, and there then remains only the water in the water traps, or U-shaped sections of pipe which prevent sewer gas from entering the house. With rags soak up all the water in the toilet bowl, and pour into it 1 qt. of kerosene, which forms a seal for sewer gas. The water in the sink, washbowl, and bathtub traps cannot be so easily removed, but by pouring 3 qt. of kerosene down the sink drains, the water is carried off and the oil left in the trap. For complete security, have the water company or the city water department turn off the water at the curb.

Moving a Crippled Automobile Single-Handed

A piece of timber, fastened with ropes to the rear hubs of an automobile, is a great help when it must be moved by hand, and by one man only. If the transmission mechanism is not injured, the easiest way to propel the car is often by the use of the starting crank. Put the car in low gear, and relieve the compression by opening pet cocks or removing spark plugs. With the timber behind, to keep the car from



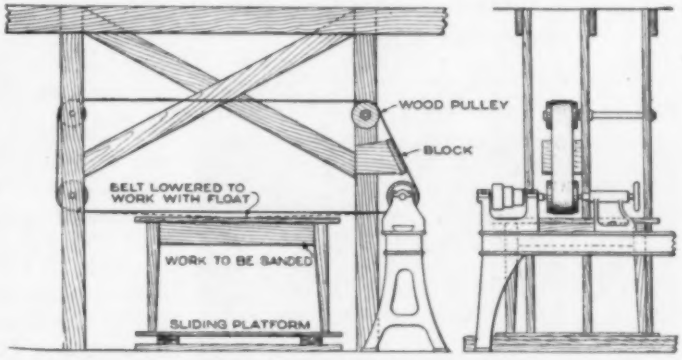
The Use of the Starting Crank and a Self-Adjusting Stop Block Makes Hand-Propelling Easy

slipping back, the job will then lose most of its difficulty.—Bonar W. Balfour, St. Catharines, Ont.

Inexpensive Belt Sander Made from a Lathe

By HARLIE GARVER

A SERVICEABLE belt machine for sanding wood surfaces can be very easily rigged up from material about the shop, in connection with a woodworking or high-speed lathe. Build up four solid wood pulleys with 8-in. faces and 10-in. diameters, turn them in the lathe and give them a very slight crown to make the belt run smoother; too much crown will be injurious to the belt. Rig up the pulleys somewhat as shown in the drawing, centering one in the lathe on a firmly held arbor, and mounting the other three on shafts which may be made of iron pipe. Turn and file a true journal surface on the pipe, and pour a babbitt bushing in the pulleys; provide grooves in either the pipe or the babbitt to carry oil. If the shafts are supported as shown, the belt can be removed without taking the shafts out; if this feature is not desired, however, greater strength will be secured by supporting the shaft on both sides of the pulley.



Wood Surfaces can be Quickly Dressed Smooth with a Belt Sander Operated from the Lathe

The garnet-paper belt used for such a machine comes in 50-yd. rolls, and costs about $5 for the 6-in. width, which is the best for the purpose. Grade No. 1½ is best for general work. To prepare the belt, cut it to the proper length, so that the ends just meet when stretched over the pulleys. Then spread glue over the paper on the smooth side, near the joint; first splice it with a piece of cloth about 1 in. wide, and then with one about 3 in. wide. Lay a piece of paper over each side to prevent the glue from sticking, and clamp, placing a small board on each side next to the paper. With a sander of this kind it has been found that the best speed is about 2,500 ft. per minute. The cone pulley of the lathe will usually allow for proper speed.

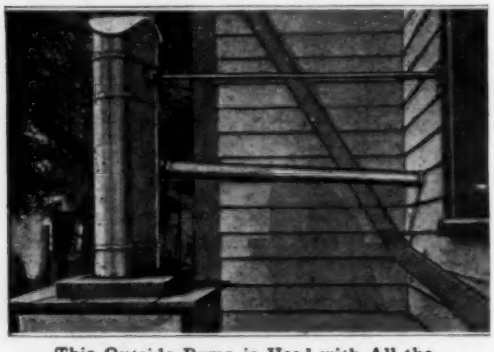
In operating the sander, the work is adjusted at such a height as to leave about 1 in. between the surface to be sanded and the belt. The machine is then started and the belt pressed down to the surface with a float, similar in size and appearance to an ordinary blackboard eraser, or with a roller, which can be made to suit the operator and the class of work to be done. In factory-made machines the adjustment for height is made by an easily adjusted platform, upon which the work rests. A sliding arrangement also allows the work to be moved to and from the operator as it is being sanded. It is quite troublesome to rig up such a device, however, and a table will usually serve for flat pieces, especially if it is set upon a low platform as illustrated. The sliding mechanism consists simply of two sets of tongue-and-groove joints, fastened at right angles to the belt. In case table tops are to be sanded, the assembled table can be placed upon the sliding platform. For irregular work the operator can usually place some kind of support to serve the particular case. Small work can be handled on a block which may be mounted just above the lathe, the block being detachable if desired, so as not to interfere with the use of the lathe.

The upper pulleys may, of course, be omitted, but the added conven-

ience and safety, which they provide by getting the returning belt up out of the way, amply justify the trouble of providing them.

Outside Cistern Pump Operated from the Kitchen

In using this peculiarly arranged pump, the housewife turns a handle in



This Outside Pump is Used with All the Convenience of an Inside Pump

the kitchen, and the water is delivered into the sink, although the pump is entirely outside the house. A chain pump is used, with the shaft lengthened to extend through the house wall, and a pipe from the pump spout also runs into the house, being set to slope slightly so that the water will flow freely.—Allen P. DeLong, Tarkio, Mo.

Emergency Fuse Repair

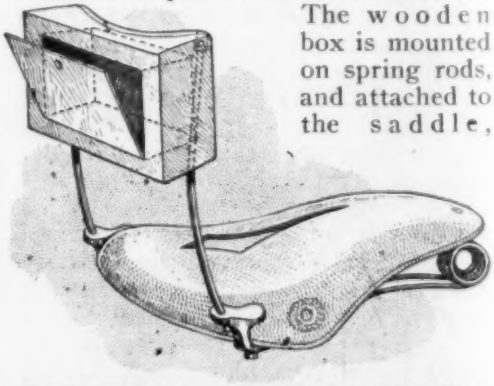
Often a fuse of the ordinary tubular kind, on either house-lighting circuits or automobile wiring, will be found to have blown out, when no new fuse of the proper size is at hand to replace it. In order to avoid interruption of service, or putting the car out of commission, many persons simply twist a piece of copper wire around the terminals on the fuse block, thus leaving the circuit without protection. This might do for an emergency, but is a dangerous practice, chiefly because it tempts one to forget to obtain a new fuse as soon as possible. A better way is to wrap the blown-out fuse with tin foil, such as is used for wrapping chewing gum and tobacco, and insert the fuse as before. If no more tin foil is used than is necessary to fit tightly around the fuse, its electrical conductivity will be low enough to give some degree of protection to the circuit until a new fuse can be obtained.

Using Fountain-Pen Filler to Fill Ruling Pens

A cleaner and quicker method of filling ruling pens than the usual one is as follows: Remove the usual ink-bottle stopper; get a cork to fit the bottle and bore a hole through it, large enough to hold tightly a fountain-pen filler or eye dropper. When necessary to fill the instruments, the ink is drawn up in the filler and applied.

Motorcycle Back Rest to Carry Camera

When carrying on a motorcycle some object, such as a camera, which may be injured by an excessive jar, it will be found useful to have some arrangement by which the vibration due to the engine can be minimized. One motorcyclist did this by building a hollow back rest, as shown in the illustration, thus making the one device serve two purposes. The material used was wood, with some simple upholstery in front, shaped to fit the rider's back. The wooden box is mounted on spring rods, and attached to the saddle,



The Camera Carrier is Built in Such a Position as to Form a Back Rest for the Rider

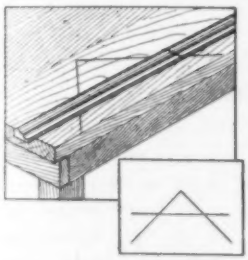
which of course should receive less vibration than any other part of the machine.—John Kakerbeck, New York, New York.

Making Drill Jigs of Cement

Where a number of similar large castings are to be drilled, a cheap and satisfactory jig can often be made of concrete. Steel bushings may be imbedded in it to guide the drills, and handles, hinges, or other parts may be made of steel, as necessary. The concrete may be easily molded into shapes which would be expensive to make of iron.—Irl R. Hicks, Centralia, Ill.

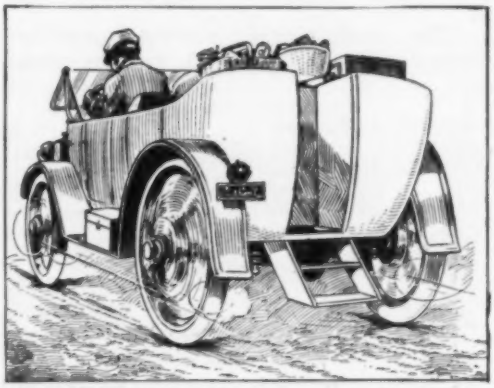
How to Do Miter-Box Work without a Miter Box

When a few miter joints have to be made on screen bead, coves, or other small moldings, and a miter box is not at hand, trouble can be avoided by drawing a straight line on the workbench or sawbuck, with two lines running through it at the 45° angles. Lay the work with one edge along the long line, holding it down with one hand, sight along the saw, and make the cut. On account of the saw being so close to the pencil lines, it is not difficult to keep the saw in alinement.



Converting a Passenger Automobile into Delivery Car

A local garage recenty modified a used five-passenger automobile to meet the needs of a grocer by simple alteratons to the body, without disturbing the gasoline tank or front seat, or altering the chassis. The upholstering and rear seat were removed, and a 2-ft. section of the sheet metal in the back was cut away, down to the car frame. A substantial step of wood, with sheet-iron hangers, was placed at the rear entrance to the car, and a box for needed tools was placed on one running board. With the flooring evened up where the seat was removed, and a guard built in front of the cut-out section of the rear, to keep the merchandise from falling

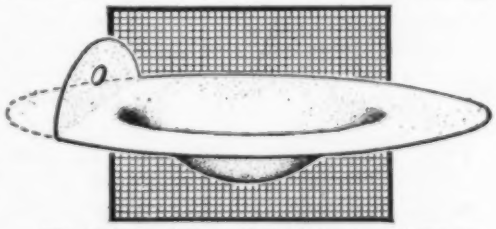


By Slightly Altering the Body of an Old Touring Car, It was Transformed into a Convenient Delivery Car for a Grocer

out, the transformed car was of ample capacity, and convenient for the speedy loading up and removal of numerous small packages of groceries. The cost of this job is only a small part of what a delivery-car body would cost, and no expert workman is required to make the change.—G. A. Luers, Washington, District of Columbia.

Soap Dish Made from End Cap of Roofing Rolls

An excellent soap dish, which costs nothing and can be obtained with scarcely any labor save that of nailing it up, is made from one of the pressed-steel caps with which the ends of rolls of roofing are usually provided. All that is necessary to make it ready for use is to bend over a portion of the rim at right angles to the main part, and to nail this to the wall. In barns,



The End Cap from a Roll of Roofing Makes an Excellent Soap Dish

garages, sheds, and many other places, these soap dishes will be found very useful.

Gas Water Heater Controlled by Electricity

The control system for a hot-water heater, shown in Fig. 1, can be made

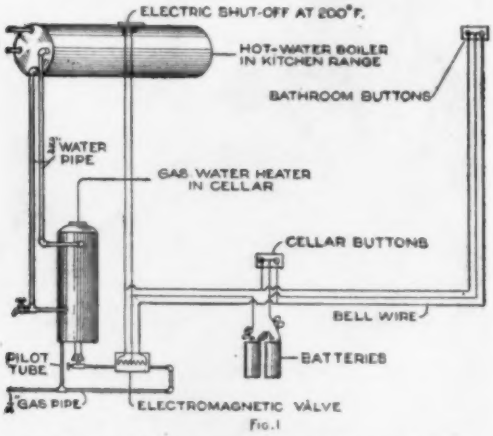


Fig. 1

The Water Heater can be Turned On or Off by Pressing a Button in Any Part of House

by anyone having a fair knowledge of electrical experimenting, and will save much annoyance. The system makes use of a hot-water tank such as is often built into kitchen ranges, and an ordinary gas water heater. The electrical apparatus consists of four push buttons, two dry cells, a small thermostat, and a gas valve opened and closed by electromagnets. The operation of the valve is shown in detail in Fig. 2. When current flows through the coil at the right, the valve is pulled open. Just before the downward motion of the core inside this coil is completed, however, the circuit through it is broken by the cessation of contact between the long lever and the brass contact spring, so that no current is used except during the actual opening of the valve. The electromagnet at the left in the same way closes the valve whenever current flows through it.

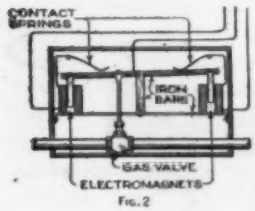


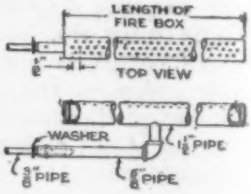
Fig. 2

The two circuits, or three wires, leading from the valve, are connected as shown, to buttons, batteries, and thermostat. The buttons may be placed anywhere about the house; any number of pairs of them may be connected in parallel, and the valve operated from any of these points. Pressing the white button opens the valve, and pressing the black one closes it. The thermostat should be set so that it will close the valve-closing circuit automatically if the temperature of the tank is allowed to rise to a dangerous point. A pilot light is kept burning at all times in the heater, just high enough so that the gas from the main pipe will ignite when turned on.

There must be sufficient friction in the valve mechanism to hold the valve closed, or gas may leak into the burners.

Quickly Made Gas Burner for Kitchen Range

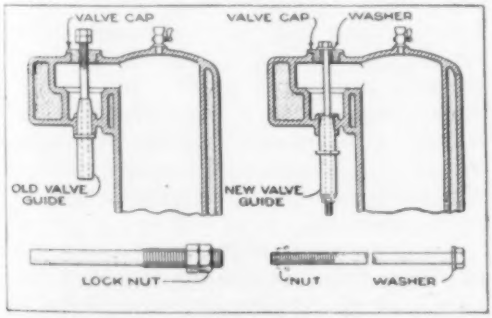
Select a piece of 1½-in. pipe, as long as the fire box of the range, bore and tap a hole for ⅝-in. pipe at the center, as shown in the diagram, and close the ends with caps or by shrinking disks into them. Drill three rows of holes, about 3/32-in. in diameter and about ½ in. apart, in the top side of the 1½-in. pipe. Let the ⅝-in. pipe be long enough to extend from the center of the fire box to the outside of the back of the stove. This burner is to be hung from the grate, while the ⅝-in. feed pipe is to pass through a hole drilled through the back of the ash pit. The small ⅜-in. or ¼-in. pipe is to be inserted into the feed pipe about 2 in.; about 1 in. from the end of each pipe drill a 1/16-in. hole for a pin to hold them together. In the end of the small feed pipe a plug must be inserted, with a hole of proper size, which will be from 1/32 in. to 3/32 in., depending on the quality and pressure of the gas to be used. The mixer is completed by slipping a metal washer over the small feed pipe, to be placed a



short distance from the end of the large pipe so as to adjust the flow of air drawn into it. A rubber hose connects the other end of the small feed pipe to the gas cock. This burner has been found to be quite satisfactory. If the fire box is filled with porous fire bricks, a very efficient heating arrangement is the result. Whenever desired, coal or wood may be burned without disturbing the burner, and gas may be used at the same time.

Renewing Valve Guides in Auto Engines

When the valve-guide bushing in the cylinder becomes badly worn and has to be replaced, it is not always desirable to put the car or truck into the repair shop or to tear down the engine to replace it. A handy device for taking out and replacing the worn guide bushing can be made by using a rod threaded at one end to fit the spark-plug thread in the valve cap, and long enough to force the guide out. As the spark-plug thread is standard, the same size rod will do for different engines. To force the worn guide out, screw the rod down by the use of the two lock nuts. To insert the new guide, a bolt is made which will pass down through the guide. The lower end of the bolt is threaded up far enough so that the guide may be forced in place by turning a nut. The head of the

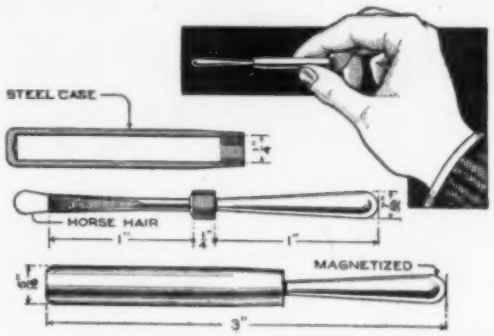


The Valve Guide is Pressed into or Out of the Cylinder by Turning a Nut

bolt, with a flat washer underneath, takes the pressure which is required to force the guide into place.

Safety Tool Extracts Particles from the Eye

Mechanics, particularly ironworkers, are continually getting small particles of steel, sawdust, or other substance



This Easily Made Tool Extracts Particles from the Eye Quickly and Safely

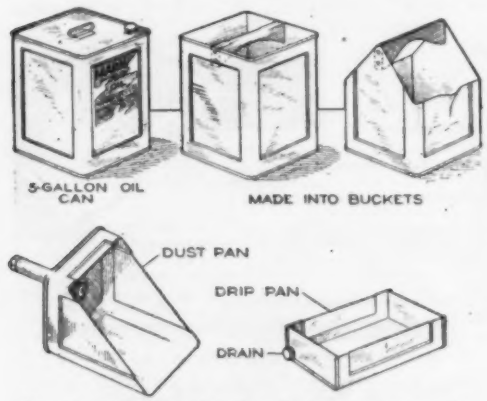
in their eyes. These foreign bodies are usually removed with a toothpick or match that has been sharpened to a point—a very dangerous instrument in unskilled hands. The illustration shows a safe and convenient instrument for this purpose. It is made of tool steel; the handle end is hardened and magnetized. On the other end a horsehair is securely fastened with a silk thread, which is then given a coat of shellac to prevent the knot from untying. For convenience and protection, the instrument is screwed into a case made of mild steel.

If the particle in the eye is iron or steel, the magnetized end will often remove it. If not, it can be loosened with the horsehair without danger of injuring the eyeball. If, however, the particle is so deeply imbedded that it does not readily respond to either treatment, a surgeon or eye specialist should be consulted immediately; indeed it is best to have medical attention if the wound is at all serious.—M. L. Lowrey, Livermore, Calif.

¶For tables of sufficient size, white porcelain door knobs can be used for sliding casters, by boring out the leg, inserting the stem of the knob, and fastening with a screw through the side.

Making Use of Old Rectangular Oilcans

Many handy articles can be easily and quickly made from empty 5-gal.

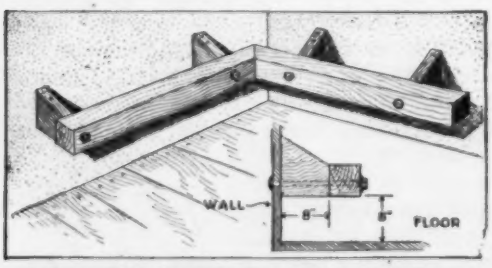


Cans in Which Lubricating Oil is Shipped can be Made Use of in Various Ways

oil tins, as shown herewith. Edges at cuts may be bent over double where desired, to give round edges of greater strength. In drip pans, the screw cap of the can forms a convenient drain.

Railing Protects Young Pigs from being Crushed

Every farrowing pen should have a rail near the wall to prevent the sow from crushing the new-born pigs when she lies down. Planks are often used for this purpose, but a rail is better for the reason that the attendant can help the little fellows out when they get trapped behind the sow. The illustration shows how the rail is held out 8 in. from the wall and 8 in. up from the floor, by brackets. Bolts pass through both the rail, the bracket and the wall. Like all fittings about a hog pen, the rail should be made very strong.—Charles L. Beckwith, New London, Conn.



A Stout Rail about the Hog Pen Protects Young Pigs from being Crushed by the Sow

Steam Jet to Thaw Frozen Water Pipes

A cold snap which caught New York last winter without sufficient coal to keep warm, played havoc with the plumbing fixtures in all parts of the city. The plumbers were kept busy day and night repairing the burst pipes and thawing out those which had managed to withstand the pressure from within. One plumber in the Brooklyn section speeded up his work by the use of steam from the heating systems for thawing out the frozen pipes. In many instances, it was found that, in order to conserve coal, tenants had shut off the steam on the top floors, leaving them without sufficient heat to keep the plumbing from freezing.

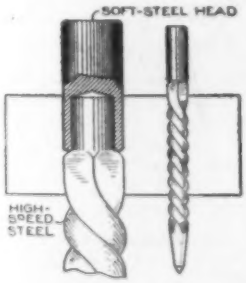
When this was the case, and other conditions permitted, operations were begun by shutting off all the steam radiators in the house except the one in the room where the fixtures were frozen. From this, the air valve was removed, and a short piece of ⅛-in. pipe screwed in its place. A rubber hose of sufficient length to reach to the bathtub and other fixtures was slipped over the iron nipple. Steam, at about 5-lb. pressure, was then turned on all the exposed plumbing fixtures, warming them up sufficiently to melt what ice they contained. Drain traps were thawed by means of the steam, and drained of water. Then the jet was turned into the drain pipe, provision against its return into the room being made by holding wet rags over all openings.

The result was that the whole length of drain pipe extending through the pipe gallery became heated and acted as a radiator, warming up the water pipes within a comparatively short space of time. Usually the cold-water pipe would thaw first, the hot-water pipe giving the greatest trouble. In

such cases, the cold water was often turned off in the cellar, the pipes drained and the steam jet attached to the cold-water faucet in the bathroom. On opening the cold-water faucet in the laundry in the cellar, the steam would soon make its way to this outlet. Again a section of rubber tubing was used, this time to connect the cold-water faucet with the hot-water faucet in the laundry tubs, and so turn the jet of steam in under the ice. The steam was gradually forced to work its way back upstairs by opening the hot-water faucets on the successive floors, closing them as soon as the water was all blown out and steam began to come. It was only in rare cases that the ice resisted this treatment for more than 10 to 15 minutes.—E. F. Hallock, Brooklyn, N. Y.

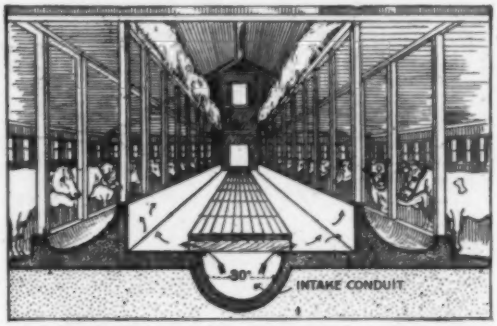
Using High-Speed Steel for Hand Punches

It was found in a machine shop that certain hand punches, broaches, and drifts gave much better service if made of high-speed steel. The objection to this was that they could not be struck with a steel hammer, being so hard that they soon ruined the hammer. Worse yet, particles of the hard steel were continually breaking off, flying with great force, and frequently imbedding themselves in the workman's hands or face. Consequently, copper or brass hammers were used, until the expedient was discovered of grinding the upper end of these tools round, and shrinking on a soft steel cap or head. The cap being of soft steel, an ordinary steel hammer can be used without danger. These tools give long service, and for many classes of work are found to be more economical than the ordinary carbon-steel tools.—M. L. Lawrence, Los Angeles, Calif.



Concrete Ventilating System for Stable

Fresh air may be carried into a cow stable and delivered directly in front of the cows' noses through a concrete conduit under the center feed alley. It must be constructed so as to be easily cleaned, and it must be kept dry.



A Conduit Running the Full Length of the Dairy Barn Provides the Cattle with Fresh Air

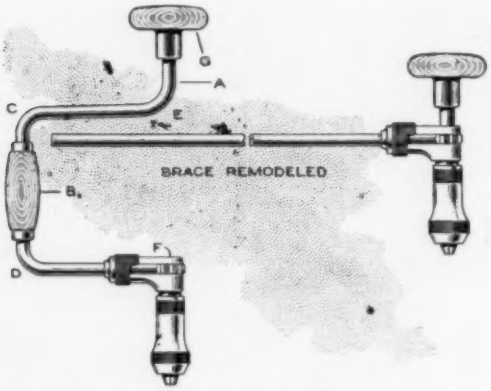
The air flue, shown in the illustration, is 30 in. wide and 30 in. deep, with a curved surface. It is covered with a board walk that extends the whole length of the feed alley. The boards are supported by crosspieces of 2 by 4-in. timber, placed 2 ft. apart, with the ends resting on the edges of the concrete conduit. This leaves an opening for the intake of fresh air, 4 in. high, on each side of the board walk, thus providing about 160 sq. in. of ventilation opening for each cow. Small wooden blocks, nailed to the undersides of the 2 by 4-in. crosspieces, prevent the board walk from slipping down into the air duct. The walk is made in sections, 12 ft. long, and may be laid over against the mangers to give easy access to the conduit at cleaning time.

The amount of air admitted into the conduit is regulated by round wooden dampers that may be operated to close or partly close either end of the conduit, according to the strength or direction of the wind.—H. A. Shearer, Chicago, Ill.

¶Steel running in steel should be hardened; cast iron running in cast iron, or mild steel in mild steel, is bad mechanical practice.

Ratchet Brace Remodeled for Work in Cramped Spaces

The plan illustrated has been devised to handle the job of boring holes in

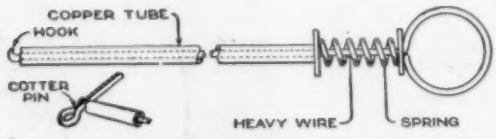


By a Few Simple Changes, an Ordinary Ratchet Brace is Converted into One Suitable for Work in "Tight Places"

close quarters, such as between two beams. Any ordinary brace with a ratchet can be adapted as described. The frame is cut with a hacksaw, at A. The wooden grip B is removed, and the corners at C, D, and E are straightened. Next bore a hole at F, in which to fit the short stem GA which was cut off. In operation, pressure is applied at F. On the forward stroke the lever revolves the drill bit, and on the backward stroke it slides with the ratchet.—Frank Barretta, Tenafly, N. J.

Holder and Pick-Up Tool for Cotter Pins

In automobile and tractor work, it is often necessary to insert cotter pins in places where there is scarcely room for a man's hand. The small instru-

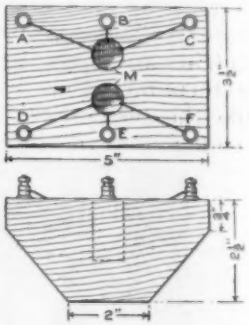


A Short Piece of Gasoline-Line Tubing and Some Wire Form a Handy Cotter-Pin Holder

ment illustrated has been found very useful for this purpose, as it holds the cotter pins firmly, and can be made long enough to reach into the most difficult place. It can also be used to pick up cotter pins or other small objects that have accidentally fallen into the crank case or pan. In using this instrument, place the handle end in the palm of the hand, and take the copper tube between the thumb and first finger. By pulling back on the tube, the instrument is opened to admit the cotter; by releasing it, the cotter is gripped tightly.—M. D. Lawrence, Oakland, California.

Switch Reversed by Tilting Mercury Cups

Finish a hardwood block, about 2½ by 3½ by 5 in., and bevel the ends as shown in the sketch. The angle of the bevels should allow the switch to rest securely upon either bevel when tilted. Secure binding posts at A, B, C, D, E, and F, and bore two ¾-in. holes, as shown at M, about 1½ in. deep. Pour melted paraffin into the holes M until filled. When cool, trim the paraffin out with a knife, so that the sides and bottoms of the holes are coated with a thin shell of paraffin. This closes the pores of the wood.



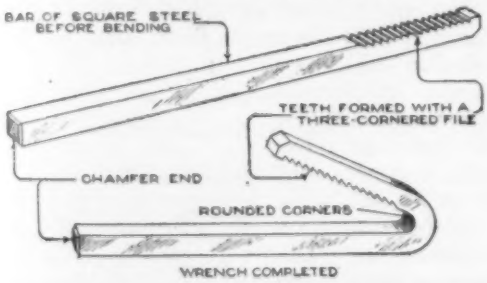
Run iron wires from the binding posts to the holes M, as shown in the sketch. The wires from B and E should reach the bottom of the holes M. The wires from A, C, D, and F should be cut off about ¾ in. from the bottom of the holes M. When the block is placed upon a table in the position shown in the sketch, pour sufficient mercury into the holes M so that the ends of the wires from A, C, D, and F are about ⅛ in. from the surface of the mercury. Pour about ¼ in. of kerosene or machine oil upon the mercury. Now plug up each hole M

with tightly fitting stoppers to prevent spilling the oil or mercury, should the block be upset by accident. The oil will prevent dangerous sparking if a large amount of current is flowing in the circuit when the switch is opened.

When the switch is tilted to the right, contacts will be made between B and C and E and F. When tilted to the left, A and B and D and E will make contact. When the binding posts A and F are connected to one wire, and C and D to the other, a double-pole reversing switch results. In an emergency the mercury may be replaced by salt water. However, for a permanent switch, mercury is much better.—J. Garrett Kemp, Stillwater, Oklahoma.

One-Piece Pipe Wrench Made from Bar Steel

A pipe wrench which will grip firmly a piece of heavy pipe can be made in an emergency from a single bar of tool steel. Simply anneal the bar, file notches in it with a three-cornered file to form teeth, bend it to an angle about like the one shown, harden the bar, and temper it so that a smooth file will cut the steel just slightly. The length of the toothed portion will depend on



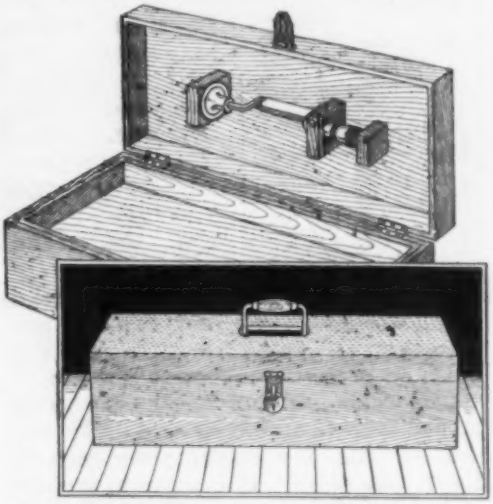
This Pipe Wrench is Quickly Made, and Quite Effective Where Tooth Marks on the Pipe Are Not Objectionable

what range of pipe sizes is to be handled.—L. M. Hinrichs, St. Louis, Missouri.

¶ Powdered graphite, shaken up in a squirt can with kerosene, is useful in lubricating the springs of an automobile. The mixture is squirted along the edges of the springs.

Bit Brace Makes Excellent Handle for Tool Box

Every mechanic's tool chest contains a bit brace, and it can readily be kept



The Bit Brace Which Is Part of Every Mechanic's Equipment Makes a Good Handle for His Tool Chest

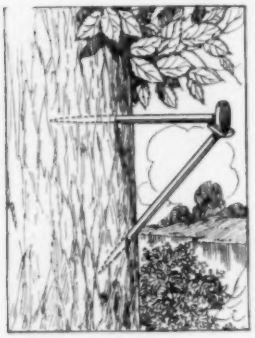
in the chest in such a way as to form a convenient handle for the chest, which will not wear out or come off. The illustration shows a suggested arrangement. When the brace is to be used, it is withdrawn from the chest by turning the button which holds the chuck in place; the other end of the brace then pulls out of the hollowed-out block of wood in which it rests. —Everett Black, New York, N. Y.

Digging Holes in Dry Ground with a Hose

When a small hole must be sunk deeply into dry, sun-baked ground, as for chicken-yard posts, or for goal posts, or backstops, for athletic fields, the best tool is a hose with water at 50-lb. pressure, or more, such as is available in most cities. With a nozzle ¼ in. in diameter, a hole, 6 ft. deep, was dug in three minutes, and only 9 gal. of water were used. For deep holes, the nozzle may be wired to a stick so as to be sure it points straight downward.

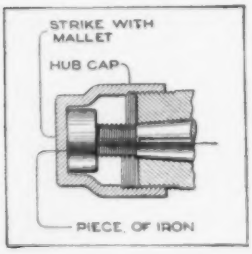
Temporary Pole Step Made from Two Spikes

Cheap but safe pole steps can be made with 5-in. spikes. One spike is driven in at an angle of 45°; another is then driven horizontally so that it rests on the head of the first one. Campers, surveyors, and others, will find this an easy way to ascend trees and poles quickly. Instead of bending under weight, the horizontal spike has a tendency to press the 45° spike farther into the hole or tree. If the head of the lower spike is curved slightly, as shown, the safety of the device will be increased.—Wm. Warnecke, Jr., New York, N. Y.



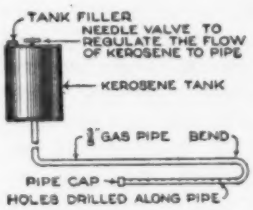
Removing Automobile Wheels with the Hub Cap

Many automobile rear wheels are fastened to the rear axle by a key in a tapered shaft, and unless a special wheel pulley is at hand, the job of removing the wheel is a puzzling one. A quick and effective method is as follows: Remove the hub cap, take out the cotter pin, and unscrew the castellated nut. Place a piece of iron or steel, of suitable thickness, in the end of the hub cap, and screw the cap onto the wheel, with the inserted piece bearing against the end of the tapered shaft. The force exerted by the cap threads is usually sufficient to pull or start the wheel, but a blow on the end of the cap with a wood or lead mallet will help when the wheel is very tight.



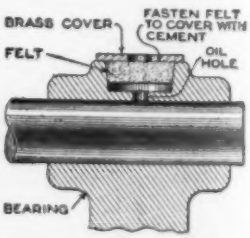
Kerosene Burner or Stove Readily Made

Due to the great scarcity of coal and wood, it is advantageous to use kerosene instead when a large fire is not required. This may be done by means of the burner illustrated. The tank may be made from an ordinary kerosene can; a tube leads down from it, and a needle valve regulates the flow of the liquid. The bottom of the lower end of the tube is bent and drilled as shown, so that the flame from the holes in the tube heats the length of tube above it, thereby vaporizing the kerosene before it reaches the burner. To start the burner, simply let kerosene run out until it can be lighted at the burner; as soon as it heats up, the hot blue flame will appear.—C. C. Spreen, Flint, Mich.



Cover for Oil Holes in Dirty Places

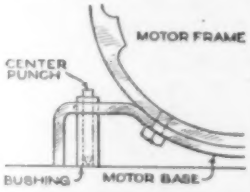
When oil holes on small shaft bearings are located in places where grit or dirt prevails, some sort of an oiling device should be used which will prevent the dirt from entering the bearing and scoring the shaft. Oil caps may be applied in some cases, but they are expensive and troublesome. In such instances, an oiling arrangement similar to that here shown may be used. It consists merely of a cover of sheet metal for the oil hole, to which is attached a pad of felt. The felt can be cemented to the metal disk, which constitutes the cover, with thick white shellac. If the shellac is too thin, it can be readily thickened by igniting a small por-



tion of it with a lighted match, and thereby burning out some of the alcohol. A cement thus prepared is impervious to oil and ordinary alkalies. The oiler is filled by running oil from the can into the hole in the cover disk, without removing the cover. The oil seeps down through the felt and lubricates the bearing, but dust and grit are excluded. The bearings of a polishing lathe, on which an abrasive dust was used, were equipped as above described, and their operation has been altogether satisfactory.—O. C. Richards, St. Louis, Mo.

Locating Bolt Holes Where Scriber cannot be Used

Where a bolt must pass through two pieces of metal separated by an air space, it is often difficult to mark the location of one hole from the other. In the case illustrated, where the base of a motor was to be bolted down, the mechanic, finding it impossible to use a scriber or a center punch in the ordinary way, turned up a bushing and used a small center punch made of drill rod to locate the center of the hole.—Joe W. Romig, Allentown, Pa.

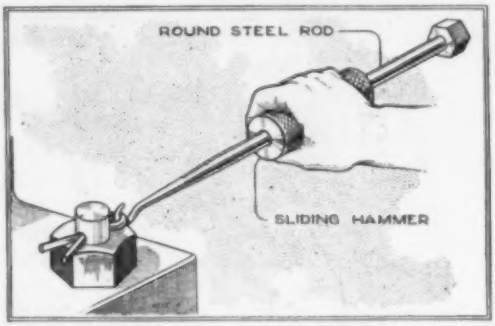


Calculating Belt Lengths for Splicing

When changing machine speeds it becomes necessary to change the length of the belt. To figure how much belting to cut out or add, subtract the diameter of the smaller pulley from that of the larger one, divide by two, and multiply the result by three. This gives the length of the piece to be cut out, or to be added. Stated another way, multiply half the difference in diameters by three. If both pulleys are changed, the rule is applied twice, once for each change. This rule is for open belts, though it is also fairly close for crossed belts.

Cotter-Pin Extractor Has Hammer Built In

This simple tool is a welcome addition to the average mechanic's tool kit.

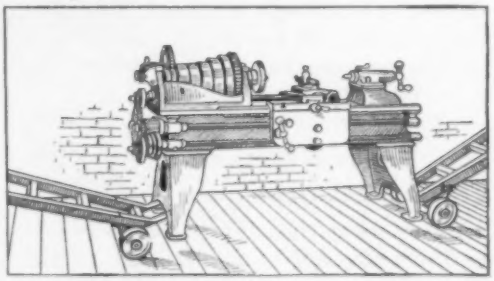


This Cotter-Pin Puller has Its Hammer and Hook Built Permanently Together

It is made from good machine-steel rod, and the hook end is thoroughly case-hardened and tempered. If the range of work done is wide, two or three sizes can be made.—Chas. H. Willey, Concord, N. H.

Moving a Lathe Easily with Hand Trucks

The usual way of moving an engine lathe around the shop is to place planks and pipe rollers under it and shift it

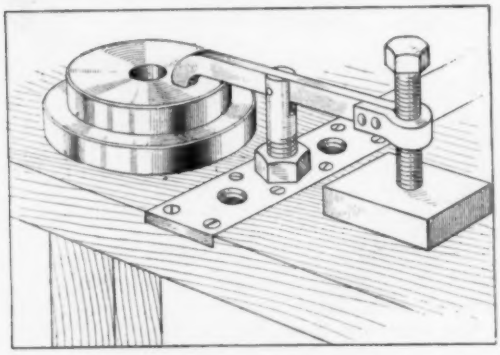


By the Use of Two Hand Trucks and a Few Minutes of Three or Four Men's Time, the Lathe can be Quickly Moved

along, but an easier and quicker method is to use a two-wheeled hand truck under each end, and lift the lathe just enough to clear the floor. While one or two helpers steady it because of its being top-heavy, it can be wheeled along the floor with scarcely any stops. Progress will be considerably more rapid than when using rollers.—H. S. Rich, Cromwell, Conn.

Clamp Holds Work Down on Top of Bench

This simple type of bench clamp, or holdfast, is constructed from stock that

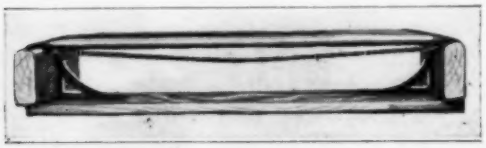


This Type of Bench Clamp Is Very Useful for Holding Irregular Objects

can be found around the shop. A 7/8-in. bolt has its head cut off and a slot cut in the body to take the clamping bar, which is made of 3/4 by 3/8-in. stock. One end of the bar is bent around a small rod and riveted; the rod is then removed, and the hole tapped out for a 5/8-in. bolt. A long strip of 1/2 by 1 1/2-in. bar stock, set into the bench and fastened with screws, has holes drilled and tapped at convenient intervals to receive the bench clamp. The long bar may also be placed underneath the bench top, so that screws will not be necessary to take the pull.

Headrest for Auto Creeper Made from Inner Tube

Creepers with solid cushions usually become covered with dirt and oil that falls down on them when in use under cars. This dirt gets into the worker's

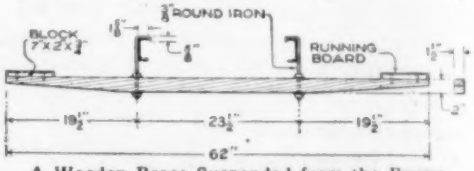


An Old Inner Tube Forms a Cushion for a Creeper Which is Easily Cleaned of Grease and Dirt

hair and scalp, and can only be removed with great difficulty. Old inner tubes are plentiful, and one can be put to good use in making a headrest which is easily cleaned. Two blocks, 6 in. high, form the sides, and a shelf bracket acts as a brace. Stretch the tubes around the frame, and reinforce, if found desirable, by placing a screen-door spring under it.—J. H. Shadek, Oradell, N. J.

Running Board on Automobile Strengthened by Brace

Many drivers of light cars load down their running boards with boxes, storage batteries, camping equipment, etc., without much thought of the fact that the running board is not built to take this extra load. It may be readily strengthened, however, by the addition of a brace such as illustrated. The dimensions given are suitable for many light-weight cars, but can be modified when necessary. The brace is hung from the frame of the car, and will help

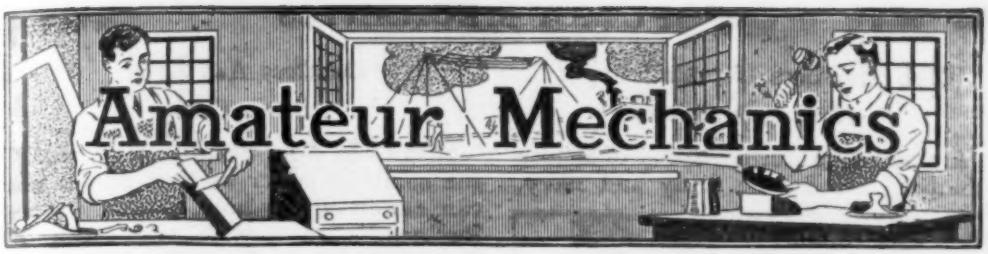


A Wooden Brace Suspended from the Frame Strengthens the Running Board

materially where extra loads are carried.—S. J. Forsyth, Syracuse, N. Y.

Threading Die Made from a Nut

A nut which has a well-cut thread can be transformed into a die by filing four or five notches in the threads of the nut with a round or three-cornered file, backing off the cutting edges with a larger round file, and then hardening the improvised die. The notches can be cut more effectively with a drill press if one is available; first screw a threaded stud into the nut, and then drill small holes around the circumference of the stud, half in the stud and half in the nut. Remove the stud and touch up the holes with a file. If the stud sticks in the nut, it can be loosened by drilling a hole through its center.—T. T. Smith, St. Louis, Mo.

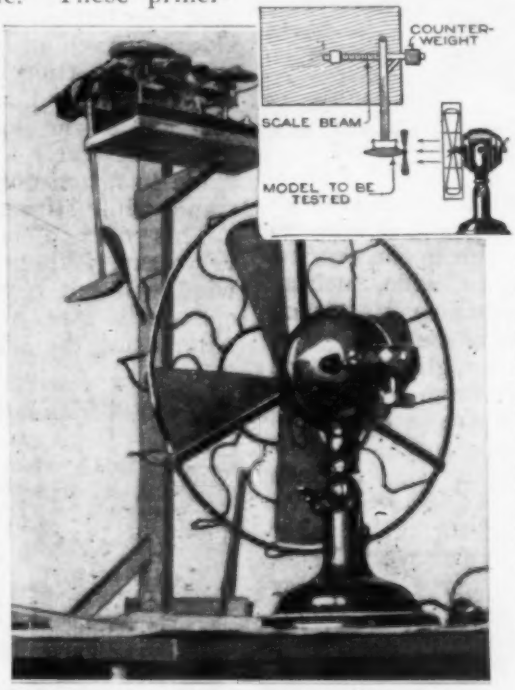


Simple Apparatus Measures Air Resistance

By RAOUL J. HOFMANN

THE principles of air resistance lie at the foundation of aeronautics. Little by little we have learned how to make machines that will glide through the air making as little disturbance as possible. These principles are explained in many books within the average reader's understanding, but their truth must remain a matter of figures and formulas to him unless he has a means of proving them for himself. This may be done, however, with a simple homemade apparatus.

An electric fan, preferably of 12-in. diameter, or larger, provides the air current whose motion past the model creates conditions similar to the motion of an airplane through the air. The model to be tested for its air resistance is suspended directly in front of the fan, by a strip of thin steel that offers very little resistance to the air. Near the point of suspension of this strip, a crossbeam is attached to it. The force with which the beam tends to rotate measures the resistance of the model to the air current. This force may be measured accurately by letting the end of the horizontal beam rest in the pan of a balance such as used in photographic work, weighing up to a few ounces. For the experimenter who has no such balance, good tests can be made by marking off the crossbeam at equal intervals and placing a sliding weight on it; counterbalance the other end so that with the sliding weight at zero, the beam will be horizontal. This weight should be about 500 grains, if the crossbeam is about half as long out to the extreme position of the weight as the distance down to the suspended model. A block of yellow pine wood, 1¼ by 1⅜ by 1¾ in., has approximately this weight.

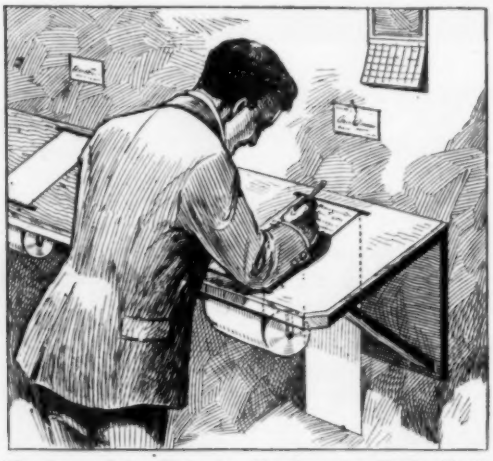


The Resistance to Air Currents of Various-Shaped Objects can be Accurately Measured by Means of a Photographic Balance

The models to be tested should be about 1 sq. in. in cross section, and made of various shapes to compare the wind resistance. It can thus be verified that the streamline, as used on air craft, consisting of a parabolic or approximately circular surface presented to the wind, with a more pointed "tail," has less resistance than any other shape of object.

Club Members Use Roll Paper in Writing to Soldiers

A club in California, many of whose members are in the army and navy,



Members of the Club, in Passing the Desk, Each Add a Few Words to Letters Destined for Members at the Front

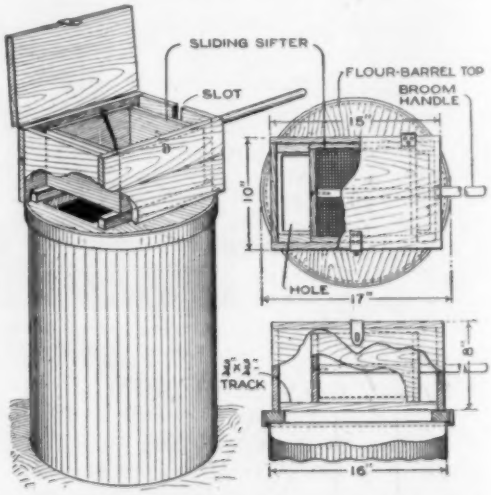
has arranged a novel device to encourage the members remaining at home to write letters to the men in the service. A roll of paper, 3½ in. wide, such as is used in adding machines, is placed under a desk or writing shelf, the paper being brought up through one slot in the shelf and down through another one into a basket. There are several such rolls on the desk, and as a member passes, it takes only a few seconds of his time to stop and add a few words to the letter destined for the member whose name is written above the slot. These names are changed every few days, covering in rotation the entire list of members in war service. At the time of changing the names, the clerk tears off the letters from the rolls, and mails them to the men under whose names they have been written, thus saving busy men's time and gladdening soldiers' hearts.—O. P. Sloat, San Bernardino, Calif.

¶To make a child's wagon run more quietly, wrap tightly several layers of insulating tape, or tire tape, around the periphery of the wheels, and fasten with bits of wire.

Dustless Ash Sifter Saves Coal

In an old flour-barrel top of nearly the same diameter as that of the ash can, cut an oblong hole, as shown, reinforcing its edge with two strips of wood, which may be covered with iron straps if desired. Nail these strips to the cover, and bend the nails over on the bottom. Make a box of ⅝-in. cypress with hinged lids, as shown. Make a frame for the sifter of ⅝-in. cypress, ½ in. less in outside width than the inside width of the box, and three-fourths as long outside as the box is inside. The bottom of the slide box is made of ¼-in. cross-mesh galvanized-iron screen, securely tacked to the sides. Attach an old broom handle in the center, letting it project through to the opposite end, and cut a slot in the rear end of the box so that the sifter may slide freely. The cover may be made to fasten down with a hasp and staple while sifting.

This method makes sifting ashes very easy. When the lid is closed the wind will not blow the ashes in the operator's face or over his clothes. After using the sifter it may be taken



The Job of Sifting Ashes may be Made a Much Cleaner One by the Use of This Covered Ash Sifter

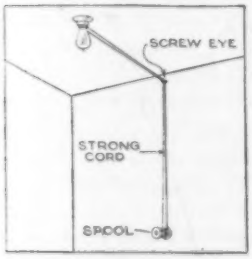
out of the frame, and the clinkers easily removed from the salvaged coal.—P. P. Avery, Garfield, N. J.

Extracting Old Lead Bullets from a Gun

When an old gun is found to have a lead bullet stuck in the barrel, a good way to remove it is as follows: Stop up one end with a cork or plug; pour in a small quantity of mercury, and cork the other end; roll the barrel back and forth, and tilt it up and down until the mercury has united with the lead, forming an amalgam, which can be poured out. The barrel is then cleaned with a cloth.—Tod Masters, Ft. Atkinson, Wis.

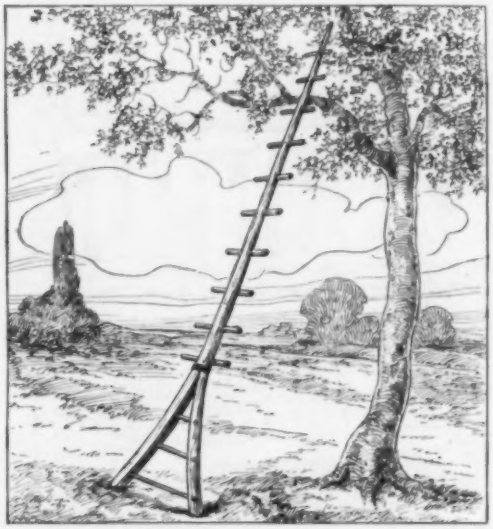
Wall Switch Made from Spool and String

Ceiling lights in hallways and passages are often wired without any switch, the circuit being controlled by some far-distant switch. When it becomes necessary to turn such lights off independently, the usual way is to reach up and partly unscrew the lamp from its socket. This is often inconvenient on account of the height of the ceiling. It may be easily done by the use of a piece of string and a spool, as shown. The string should be wound around both spool and lamp base several times, so that it does not slip on either. A slight rotation of the spool will then turn the lamp off, and on again.—J. Garrett Kemp, Stillwater, Okla.



Portable Ladder Made from a Pole

A strong, handy, and safe ladder for use in picking fruit can be made from a straight pole, or a small, tough tree trunk, by splitting it for about 3 ft. from the end, using a stout iron ring as a ferrule, and adding rungs as illustrated. If the wood is dry, it may have to be soaked in water for some time before it will split satisfactorily without breaking. The ladder is really safer than it looks, and is quite handy in reaching into fruit trees.—W. Wallace Snyder, Bedford, N. Y.



The Ladder is Made from a Single Long Pole of Tough Wood, Split and Secured by a Ferrule

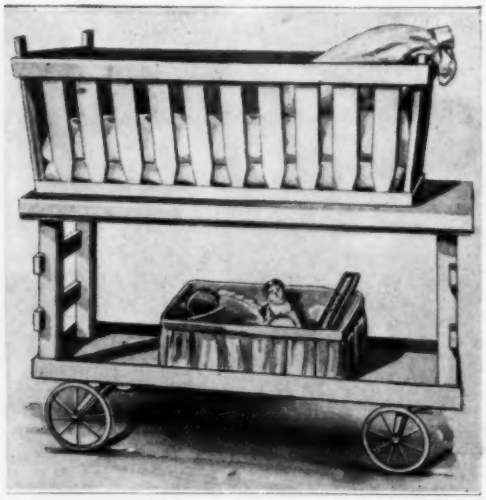
Immersing in Water Tests Diamond's Genuineness

A good way in which to find out whether a diamond is genuine is to place it in clear water. If the gem is real, the facets, or cut portions, stand up with great clearness, and the diamond also sparkles in a remarkable manner. On the other hand, a so-called paste diamond is blurred in appearance, and does not sparkle. The difference is plainly seen in the two enlarged photographs, the one at the right showing the genuine diamond.—S. Leonard Bastin, Bournemouth, England.

Diamonds can be Tested by Noting Their Appearance When Immersed in Water. The Facets of a Genuine Stone will Sparkle with Great Clearness

Baby's Crib can be Wheeled around the Nursery

This homemade baby crib has been found very convenient, as it combines



The Table on Wheels, with the Baby's Playthings or Toilet Accessories on a Lower Shelf, Carries the Baby in Either Crib or Tub

the desirable features of a bed and a buggy. Wheeling the bed lulls the child to sleep; the wheeled bed has all the comforts of a stationary bed, and goes wherever it is wanted. It was made in two units for convenience; the baby's tub can be set in place of the bed, and baby's toilet conveniences are always close at hand in the usual basket, which rests on the lower part of the car.—J. C. Grindell, Seattle, Washington.

Whistle Made in Woods of Birch Bark

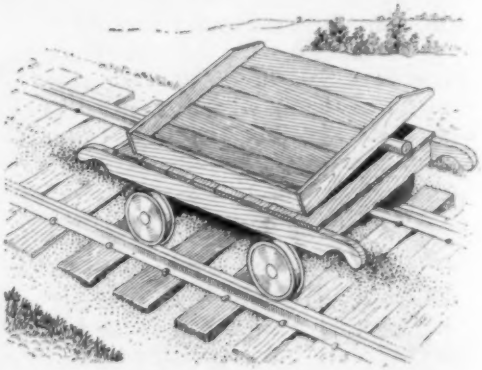
Desiring a loud whistle to signal to his comrades, a hunter quickly devised one with a strip of birch bark which he found near by. Cutting with his hunting knife a strip of white birch bark, about 1 ft. long by 6 in. wide, he rolled it tightly so that it formed a cylinder of about 1-in. inside diameter. Setting one end of this cylinder firmly in the palm of his hand, he blew over the edge of the upper end, as one blows over the mouth of a bottle to produce a whistle. The result was a piercing whistle that could be heard a long distance.—F. E. Brimmer, Dalton, N. Y.

To Fasten the Flag So It Will Not Tear

Flags are often fastened to their ropes by simply tying one end of the rope in the eyelet in the lower corner, and the other end in the eyelet at the upper corner; this has a tendency to tear the flag. A much better way is to thread the rope through the lower eyelet, and tie both ends to the upper one. When the wind is high, the lower corner then moves up slightly, and in calm weather it slides down. This method of holding the flag has been found to add materially to its durability.

Roller Aids in Dumping Dirt from Push Car

When excavating along a railroad and hauling the dirt a short distance to be dumped, much time will be saved if the dirt is placed on a wooden pan with a roller underneath. To unload the dirt, it is then unnecessary to shovel the dirt from the car; the pan is simply pushed over on the roller to the edge, and falls over the side of the car, after which the empty pan is readily recovered. If given a hard push, the dirt



The Use of the Dumping Pan Does Away with Shoveling the Dirt off the Push Car, Thus Saving Much Time

may be thrown some distance from the track.—J. J. O'Brien, Chicago, Ill.

A Collapsible Stage for Amateur Dramatics

By L. B. ROBBINS

A STAGE that can be knocked down so as to be stowed away in a small space, or placed upon a truck for transportation, will appeal to the amateur dramatic company without facilities for holding performances or rehearsing. Nearly all small towns, and most of the districts of the larger cities, have companies of amateur actors, and to these the stage here described will directly appeal. It can be assembled in a few moments, and used to give entertainments in churches, lodge rooms, and halls not furnished with a regular stage or platform. After the performance is over it can be as quickly knocked down and tucked out of sight, or loaded aboard a truck and carried back home, the dimensions being adapted to this purpose.

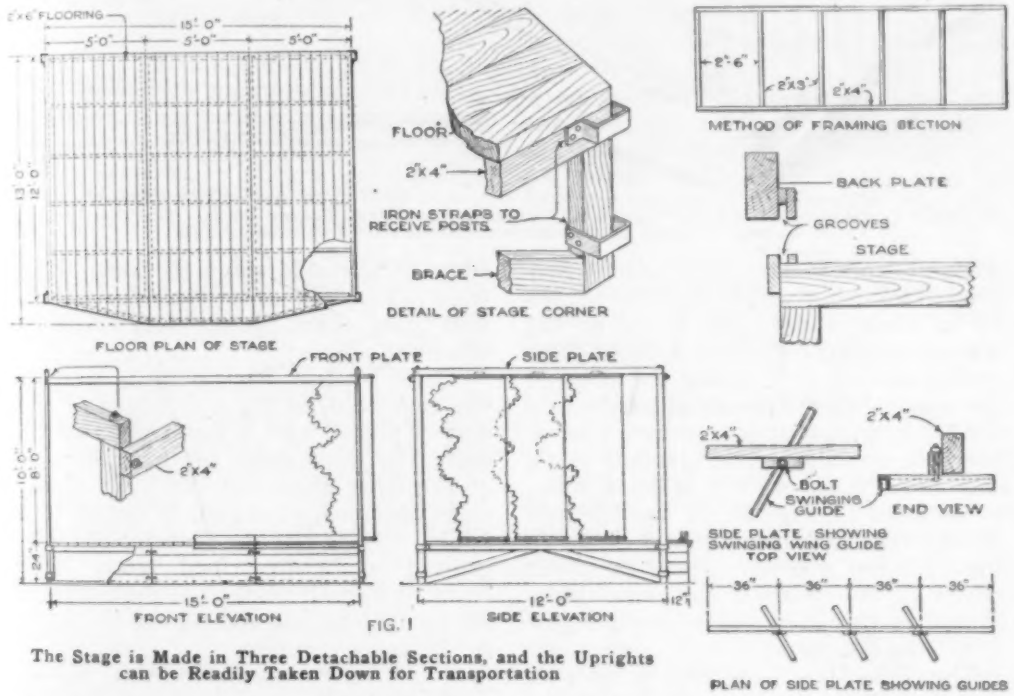


FIG. 1

The Stage is Made in Three Detachable Sections, and the Uprights can be Readily Taken Down for Transportation

It consists of three sections, as shown in Fig. 1. The central section is 5 ft. wide and 13 ft. long; the other two sections are of the same width, but while the edges bearing against the central section are 13 ft. long, the outer edges are reduced to 12 ft. When the three sections are placed together they form the stage illustrated, 15 ft. wide, 13 ft. deep down the center, and 12 ft. deep down from the sides. The detail sketch of the frame, at the upper right-hand corner, shows the size of the floor timbers and end headers. The sections are boarded lengthways, with light but strong matched flooring; the edge boards on the sides of the abutting sections are fitted so the tongues and grooves of these particular ones will match loosely.

Each section is then furnished with four legs of 2 by 4-in. timber, well braced by slanting pieces. The drawings show the stage as being 2 ft. from the floor, but this is optional; the legs may be made of any convenient height. Board in the front panels with a fancy, matched stock, and run a small half-round molding along the top, to hide the sawed-off ends of the flooring. Place heavy hooks and screw eyes at the front and rear ends of the sections, to hold them securely together when assembled.

On each outside leg of the side sections, bolt a pair of iron straps, as shown in detail, to hold the 2 by 4-in. uprights securely against the legs, along the sides. The detail sketch illustrates their construction fully. A corresponding set of swinging guides should also be attached to the outer

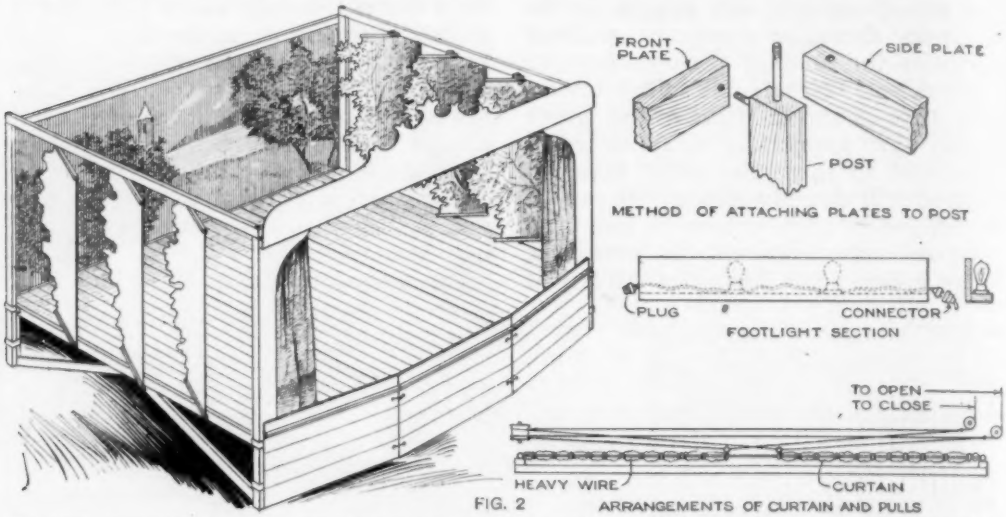


FIG. 2

The Stage Completed; also Details of Corners, Footlights, and Curtain-Control Cords: The Two Curtains are Opened or Closed by One Motion, the Same Cord Controlling Both

without unnecessary looseness. Any good blacksmith will make these straps for a small sum. Use bolts or lag screws in fastening. The upright posts should extend 8 ft. above the floor of the stage, broad face against it. Into the top end of each post, screw a headless bolt, or rod, threaded on both ends, and allow it to project at least 4 in., as detailed in Fig. 2. A similar bolt should also be placed about 2 in. down from the top, projecting over the outer edges of the posts. All these bolts should be threaded and screwed 2½ or 3 in. into the wood.

The side plates are two 2 by 4-in. timbers, laid edgeways on top of the corner posts; the upright bolts slip through holes in the ends of these plates, and are held firmly by nuts. These side plates are also provided with three swinging slots, or guides, to accommodate the "wings," as the sidepieces of scenery are called. These guides are bolted to three blocks screwed to the inside face of the side plate, each block having a single bolt hole bored through the middle. The guides are merely 2-in. strips of wood, 3 ft. long, with retaining strips nailed edges of the side stage sections. Bolt them about 2 in. from the edge, which will bring them plumb with those on the plate above.

The 2 by 4-in. back plate is held by the two bolts in the rear edges of the corner posts, with a nut tightened on each. Arrange strips on the underside of the back plate and the back of the stage sections, as shown in detail, into which may be slid the sections of background to be described later. The front or "arch" plate is a duplicate of the back plate, and attaches to the posts in the same manner.

When fully assembled, this framework should be rigid and substantial; the attainment of this depends much upon the way the corner posts fit in their sockets, and the tightness of the bolts holding the plates.

The footlights are built in three sections, and their construction depends somewhat upon the method of illumination. If electricity is available, simply set two lamp sockets on a piece of narrow board the length of the stage section's width, and nail a shielding board upright at right angles to it. This shield can be either straight-edged or

cut with a fancy edge, as preferred. Fit the footlight section in place, and screw to the floor. Then remove it and leave the screws in the base, lettering each section so it may be replaced quickly whenever the stage is assembled. If gas or lamps have to be resorted to for illumination, build the sections in the form of a trough, to fasten to the front face of the stage. If gas is used, drill equidistant holes in sections of piping, and connect them with rubber tubing. Electric light will be found decidedly better, however; if bulbs are carefully selected, an automobile storage battery, or two, will furnish sufficient current for a performance.

For the curtain, set two large screw eyes in the rear face of the front plate, one at each end. Connect these with a piece of heavy stiff wire as a slide for the curtain rings; place a single pulley at one end of the plate, near one screw eye, and a double pulley at the other end. Use heavy opaque cloth for the curtains, and provide lead weights in the bottom hem to keep them hanging taut. The illustration shows the arrangement of the draw cords. The ends all pass over the double pulley, in such a manner that by pulling on one string both curtains are opened, and by pulling on the other both are closed.

The wings and backgrounds, and other pieces of scenery, are usually difficult things for the amateur to make, but by using a light-weight plaster board much of the difficulty can be overcome. For the wings, choose pieces 8 ft. by 30 in. (a stock size), and any convenient size for the background and the various bits of small scenes, building them up in sections horizontally.

Wings should be first covered with thinned shellac and then painted with flat colors. Use as few colors as possible, and make the scenes simple. One with artistic ability can readily see ways to use his talent to advantage. Backgrounds are treated in the same way, but should be painted in somewhat lighter shades, to give the effect of distance.

Cut the lengths just long enough so they will slide snugly in the grooves provided for them. Number the pieces and their corresponding grooves, so as to avoid delay while changing scenes. By painting a different scene on each side, one set of wings and grounds can be made to do double duty. Cut the plaster board with an old hacksaw, and smooth up the edges with a knife.

The decorated top piece made of plaster board, nailed to the front plate and corner posts, will greatly improve the appearance of the stage from the audience. Curtains run from the front corner posts to the wall will provide dressing rooms for the company.

To assemble, hook the three stage sections together, fit the footlights in place, erect the corner posts, and bolt on the side, back, and front plates. See that the curtain works freely, set the proper wings and background in place, and the stage is ready for the show.

When the performance is over, the outfit may be quickly taken apart, and loaded on a truck before the performers are ready to start home.

Multiple Hooks for Catching Large Fish

In trolling for large fish in the Florida waters, where bait 8 or 10 in. long is used, many of the guides employ three large hooks in tandem. This is accomplished by passing the point of the first hook through the ring of the second, and the point of the second through the ring of the third. This not only holds the bait firmly in place, but increases the chance of hooking a fish which bites at the end of the bait.

The Use of Three Hooks on the Same Line Decreases Materially the Danger of a Large Fish Escaping with a Part of the Bait

A strong wire leader, 3 or 4 ft. long, should connect the line with the leading hook.

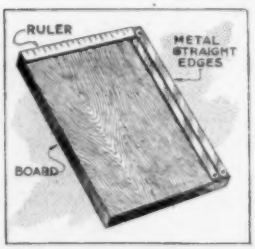
Skate Straps Hold Rubber Overshoes in Place

Rubber overshoes are often drawn off by suction while walking in deep mud. This may be avoided by securing them with a pair of ordinary skate straps adapted for the purpose. The straps give support where it is most needed, namely, at the rear of the heel.

Each strap is slit through the center for a distance of 3½ or 4 in., so as to leave a closed loop, or eye. The rear edges of the heels are inserted in these loops, and the straps are buckled at the ankle in the same manner as with skates, thus holding the overshoes snugly in place.

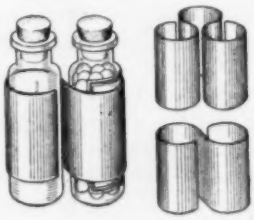
Photograph-Trimming Board for Amateurs

A simple trimming board may be readily made, largely of scrap materials, as shown in the illustration. A flat board of the desired size is fitted with a ruler at one edge, and with two straight pieces of metal at an adjacent edge. These may be made from old hacksaw blades, by grinding off the teeth, and should be placed so that there is just room enough between them for the point of the pocketknife to pass. The prints to be trimmed are passed under the metal pieces, and cut with the point of the knife. The knife must, of course, be well sharpened to give smooth edges. The ruler should be set accurately at right angles with the straight edges, and should be fastened down tightly so that prints do not get caught under it. A hardwood board will last longer before the knife cut becomes objectionably large, and if desired, the board may be made with a renewable strip of wood, or fiber, directly under the knife point.—G. I. Mitchell, Ruston, Louisiana.



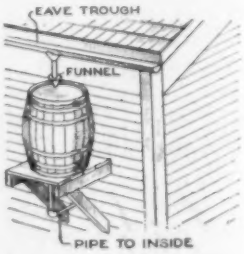
Holder for Small Bottles Made of Sheet Metal

A very handy method of holding small bottles securely is to bend a piece of sheet metal to an S-shape, each loop a trifle smaller than the bottle or tube to be held. A small bottle easily falls over, but this added weight has a tendency to keep it upright. The design shaped to hold three bottles or tubes is still better. Marks, or labels, can readily be placed on the outside of the metal holder.—H. E. Gifford, Medford, Mass.



Improvised Gravity-Pressure Water Tank

By placing a barrel under the eave trough of a shed or barn, or several of them, if the roof is a large one, soft water can be collected and kept handy for washing the automobile or carriage. The water is piped into the shed, and a faucet provided to which a hose can be fastened. While the pressure is small unless the roof is unusually high, it is sufficient for the purpose mentioned. The arrangement is also useful at the summer cottage, to collect soft water for toilet purposes.—Dale R. Van Horn, North Loup, Neb.



Rubber Cement Replaces Thumb Tacks

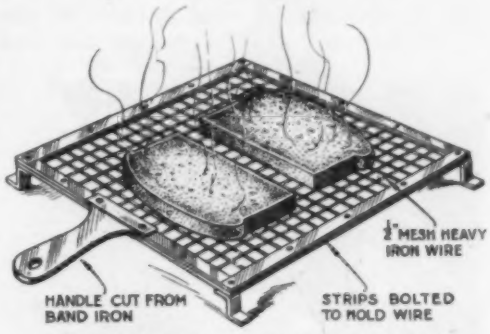
Use rubber cement to fasten down small drawings or tracings, and avoid the annoyance caused by tacks, which interfere with the movement of the square and triangle. Smear rubber cement on the edges of the paper, and fasten it to the board, carefully squeegeeing the paper so it lies flat. After the drawing has been finished, raise one corner with a knife, and strip it from the board. The dried cement will rub off easily.

Flooring and General-Utility Saw Made from Kitchen Knife

A saw that will prove handy on many occasions can be made by filing teeth in the blade of a large kitchen knife after first filing down the edge of the blade. Only the teeth near the point will require much setting. Because of its large handle, which can be grasped firmly, and a blade that is stiff, the tool possesses all-round utility. For example, a floor can be cut into without the preliminary use of an auger. First, tack a strip of board on the floor to serve as a guide and then work the curved edge of the saw back and forth beside it until a slit has been started.—Henry Simon, Laguna Beach, Calif.

Bread Toaster for Convenience and Efficiency

The bread toaster illustrated can be easily made from a piece of coarse wire netting and some strips of sheet iron. The toaster is 8 in. square, so as to fit over the burner in the kitchen range. The iron strips used for the sides are ¾ in. wide, and short strips of the same material form the four legs. The wire is held between the two strips forming the sides, by rivets or bolts; these may be placed between every two wires if necessary to hold them. The wires should be about ½ in. apart. A sheet-iron handle may be fastened under two

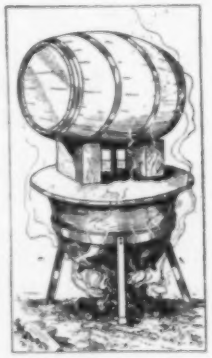


Strips of Sheet Iron and a Wire Mesh Make a Practical and Durable Bread Toaster

of the rivets, and covered with asbestos or wood to avoid burning the fingers.—P. P. Avery, Garfield, N. J.

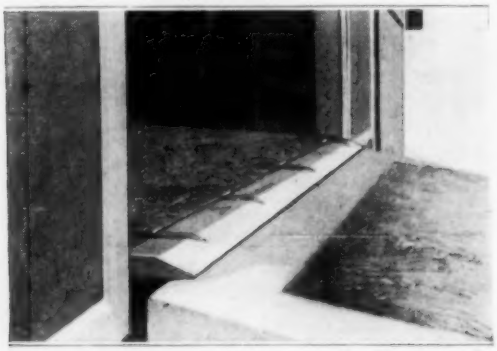
Cleaning Barrels and Kegs by the Use of Steam

Cleaning cider barrels and beer kegs so that they can be used for other purposes is a formidable job without special apparatus. By the use of a steam kettle, however, the barrels can be thoroughly cleaned and sterilized. An ordinary farm kettle is shown in the illustration, with a flat wooden cover and a ¾-in. pipe leading through it into the bunghole of the barrel. A fire is built under the kettle, and the steam penetrates into every corner of the barrel. The condensed steam flows back through the same pipe, depositing all dirt in the kettle, from which it can easily be cleaned. If the cover is bolted to the kettle flange, with a paper gasket between, a higher pressure can be generated, doing the job quicker and better, but care must be taken that the pressure does not become high enough to injure the barrel.—Le Grand Budd, Phillipsport, N. Y.



Barn-Door Sill on Hinges Protects Horses

After a valuable horse had broken its leg by getting its foot caught in the space between the barn-door sill and



The Hinged Sill Covers the Space in Front of the Door, and Prevents Accidents to the Animals

the driveway, its owner rigged up a hinged sill as shown. When the doors are open, the sill is in place, covering the opening; when the doors are to be closed, the sill is swung back, making room for the doors.—H. V. Stanley, Chicago, Ill.

Rubber Overshoe Clears Clogged Drain

Should the waste pipe of the kitchen sink become choked up, try the following:

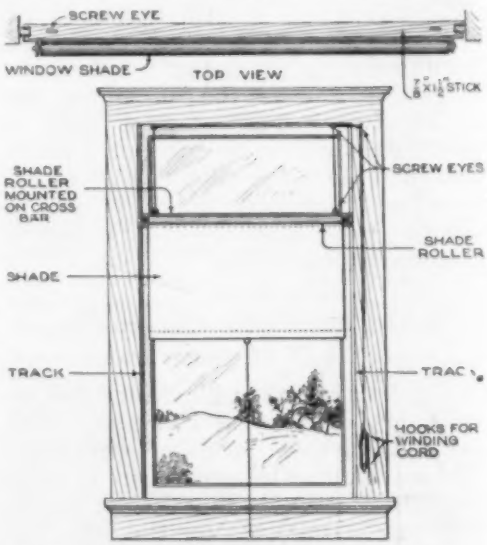
Place the heel of an ordinary low rubber overshoe, mouth downward, immediately over the opening of the waste pipe, the sink being filled with water, so as to cover the overshoe. Alternately press down upon it and release it. This will cause pressure in the pipe, which will help loosen up the accumulations in it.—Will Rodgers, Halifax, Can.

Imitation Indian Beads Made from Magazine Covers

Procure a number of old magazines which have covers printed in several colors. It is advisable that the covers be of the same width so as to insure equality in size of each "bead." On the reverse side of each cover, mark off triangles, thus: On one edge, measure down from the top, ½ in. for the first division, and place marks 1 in. apart in a vertical line below. On the opposite edge, space off 1-in. divisions. Connect these points, zigzagging across, and cut out the triangular pieces. Wind the triangle on a hatpin, beginning with the base and ending with the vertex, which is pasted to prevent unwinding. After a number of these beads have been made, varnish them all to make them glossy and hard. After they have been sufficiently dried, put them on a string, and the result will be a chain of beads which resembles some old Navajo chains or "wampum," due to the color combinations on each "bead."—Abel Greenstein, New York, New York.

Window Shade Adjustable at Top and Bottom

An ordinary window shade, when mounted at the top of the window, cannot be adjusted so as to cut off the view through the lower part of the window without cutting off all light from



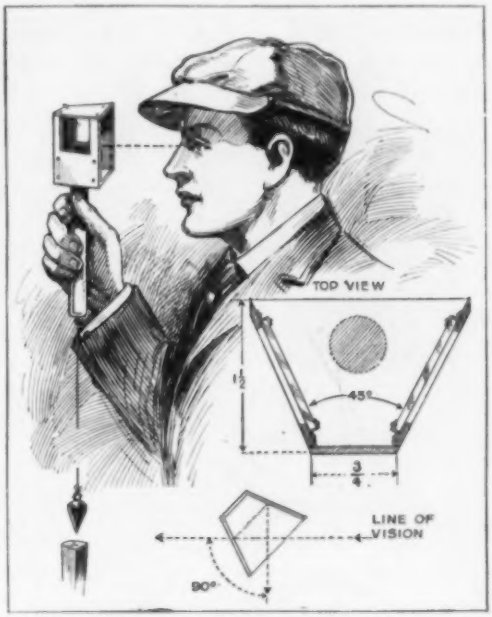
By Mounting the Shade Roller on a Sliding Cross Bar, Any Portion of the Window may be Shaded

entering the upper part of the window. This condition is sometimes remedied

by mounting the shade at the bottom of the window, and unrolling it upward, but this is often objected to as being unsightly. The illustration shows how a shade may be made adjustable at both top and bottom, so that any portion of the window may be shaded as desired. The roller is mounted on a wooden bar, which hangs from two cords and slides up and down on guides, by means of grooves cut in its end. The two lengths of cord should be adjusted so that the roller is exactly horizontal, and should then be tied together so as to keep it so. The grooves must, of course, fit rather loosely on the guide, and the cross bar may be weighted if necessary.

Accurate Right-Angle Finder Easily Made

This simple instrument is capable of very delicate adjustment, so as to lay off a right angle quite accurately in the course of such jobs as building fences, locating sheds, etc. It consists essentially of two small mirrors set at an angle of 45° with each other, with openings above, so that one may look into either mirror, and at the same time sight, through the opening, an object straight ahead. The device is operated thus: The observer holds the instrument at the vertex of the right angle to be laid off, and sights through it along one side of the angle. A helper then moves a pole or other object at the left, until it comes into view in the mirror. How this produces a right angle is shown in the diagram, the dotted lines showing the two lines of vision, one as turned by the mirrors to an angle of 90°, and the other straight through the opening above the mirror. For accuracy, the two mirrors must both be exactly vertical, and must make an angle of exactly 45° with each other; they may be adjusted to secure accuracy by placing shims of paper under the corners. A test of the instrument is to lay off two right angles having a common side, and see whether the two other sides form one straight line. The instrument may be made of thin wood, and the small pieces of mirror fastened in with tin clamps held

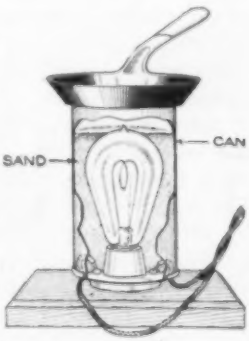


A Small Homemade Instrument, Which can be Carried in the Pocket, Enables Anybody to Lay Off a Right Angle

by cigar-box nails, or preferably by small screws.—P. P. Avery, Garfield, New Jersey.

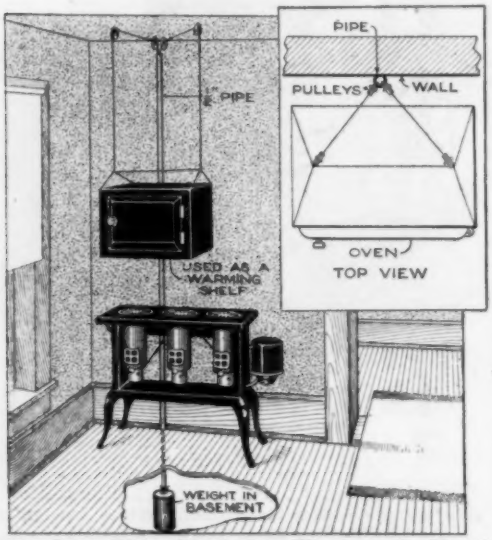
Electric Light in Sand Makes Handy Heater

An ordinary incandescent lamp, with some sand and a tin can, can be used to fry eggs. Procure a can large enough so that a space of ¼ in. will remain between its sides and the widest part of the lamp. Cut a hole in the base of the tin can, and fasten in an electric socket. Screw in the bulb and fill with sand, as shown. Place a frying pan on top of the can, and be sure it fits tightly. Turn on the current; in a few minutes enough heat will be generated to cook the eggs.



Putting the Oven Away When Not in Use

Modern oil stoves with detachable ovens are quite convenient, but the oven is usually in the way when not



The Oven, When Attached to Wires, can be Placed Ready for Use or Out of the Way in a Few Seconds

in use. This disadvantage can be turned into a great convenience by hanging the oven from wires, as illustrated. Piano wire, made of hard flexible steel, is the best to use, and the pulleys should be large enough so that the wire will bend over them easily. They should be fastened to the ceiling joists and should turn easily. If large pulleys are not available, small pulleys, such as are made for clothes-lines, can be used with chains or heavy twine. The wire, or twine, is fastened in small holes at the four corners of the oven, and the other ends of the long pieces are attached to a weight. The weight may hang in the basement, so as to be out of the way, or a large pipe may be used and a window-sash weight may move inside of it.

Besides getting the oven out of the way when not in use, the arrangement makes it useful as a warming shelf. When suspended 10 or 15 in. above the flame, it will keep food warm without overheating it.—Henry Simon, Laguna Beach, Calif.

Indelible-Pencil Marks Protect Sealed Letters

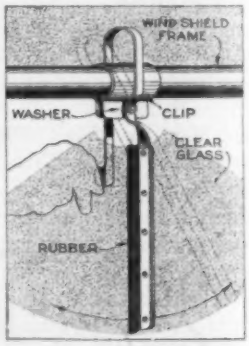
With a dry indelible pencil, mark light lines on the back of the sealed envelope, beginning on the flap and ending a short distance below it. If the envelope, so marked, should be steamed, in order to open it intact, the lines made with the indelible pencil turn a bright purple and remain plainly visible, showing that the envelope has been tampered with.—William Warwick, Chicago, Ill.

Linoleum Inner Soles for Shoes

A perfectly satisfactory material for inner soles for shoes is linoleum. Cut them to the required shape and size, and smear the rough side with glue or shellac. When nearly dry, put into the shoe and press firmly in place until set. Such inner soles will often outwear those sold in stores.—L. B. Robbins, Harwich, Mass.

Automobile Windshield Cleaner for Bad Weather

When driving a car in a snowstorm or heavy rain, it is no mean problem for the driver to keep his windshield from becoming clouded. The illustration shows a rubber strip which swings through an arc and scrapes the moisture from a space large enough for the driver to see his way, operating like the well-known window cleaner. A brass clip is fitted over the top of the windshield, and a brass strip is pivoted on a screw attached to one end of the clip.



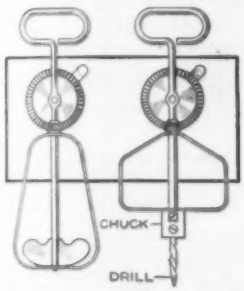
One side of the strip, bending over the top, extends down the front of the glass, and carries the rubber strip; the other side extends down back of the

glass, to be used as a lever. The rubber strip, which touches the glass firmly, is riveted by holding it between the main strip and a small strip of brass outside the rubber.

By a single stroke of the lever, as occasion demands, the driver can thus clear a circular section in front of his face.—Harry W. Marshall, San Francisco, Calif.

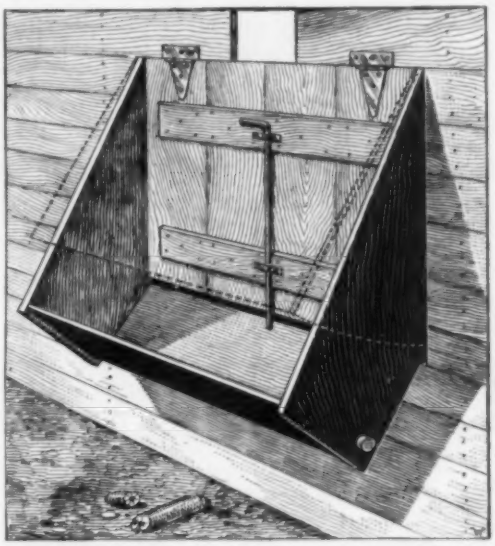
Useful Hand Drill Made from an Egg Beater

A cheap but useful hand drill for light work can be made from a 10-cent egg beater of the type shown, or one built on the same principle. The egg beater is modified, as shown, by adding a chuck, which may be made either from a piece of tubing with setscrews in it, or from a connector such as is used for electric wires. —Wm. Warnecke, Jr., New York, New York.



Novel Feed Trough for Farm Live Stock

The trough is built in the usual style, of heavy lumber, and is 3 ft. long. The sides are cut to the shape shown, and nailed to the ends of the trough, one of the sides being bored with a 1-in. hole at the angle of the trough, and the hole fitted with a plug. The trough thus constructed is fitted into an opening cut for it in the side of the pen, the projecting edge of the trough lapping over the bottom of the opening. A panel, just fitting into the opening, is hinged at the top, and is arranged to swing inward. When hanging perpendicularly it shuts off the trough from outside interference and allows the stock to feed at pleasure. When swung inward, it allows the filling of the trough without interference from the stock. By flushing the trough with water, it can be readily

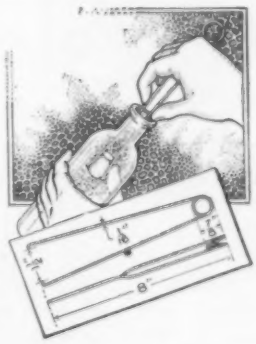


Shifting the Position of the Gate or Panel Brings the Trough Inside or Outside of the Pen, as Desired

washed, and the refuse drawn off through the hole in the side. An iron rod, operating through eyes in the panel, and fitting into sockets properly located, keeps the panel in position.

Handy Cork Puller Leaves Cork Whole

The illustration shows a very handy and simple device for extracting corks which have been accidentally pushed into a bottle. It is made of wire, about 1/16 in. in diameter and about 8 in. long. The two ends are bent as shown. Spring-steel wire, heavily plated to avoid rust, is the best for the purpose, but spring brass will also serve. In order to extract the cork, insert the device into bottle, close the two ends upon cork, and pull.—J. A. Fuks, Dayton, Ohio.

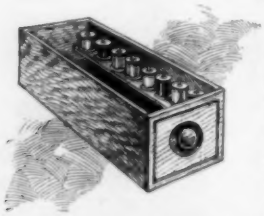


Magazine Rack Made from Single Piece of Wire

A rack of this type can be readily made in any size desired, for use in holding magazines, pictures, music, etc., for display in windows. The wire used should be stiff spring steel or brass, which cannot be bent at too short a curve without breaking; care should therefore be taken in making all bends, and loops should be formed at the points where the wire must be bent back upon itself, the inside diameter of the loops being not much less than the diameter of the wire.—William E. King, Monessen, Pennsylvania.

Spool-Holding Device for Sewing-Machine Drawer

Spools of thread, as kept in a sewing-machine drawer, often present a sad contrast to the businesslike arrangement illustrated, and much time is lost in looking for a certain spool. The shelf with pins, made of small wooden rods, or nails with the heads removed, is half of the system, and the other half consists in fastening the loose end of each spool after using it. If the cut in the edge of the spool, where the thread was originally fastened, has broken away, cut another, and pull the end of the thread into it. Two or more shelves will often be useful, with thread assorted by color and size, so that when a spool is exhausted, the fact will be exhibited by a vacant peg.—Henry V. Simpson, Chicago, Ill.

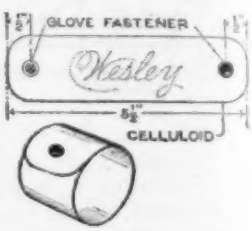


Mirror Shows if Gas Range is Lighted

In many gas ranges it is difficult to determine whether the oven flame is burning properly, or is turned on the amount desired. A simple remedy is to fasten a small mirror, or a piece of an old mirror, under the burners, in such a position that the flame can be easily viewed.—Thos. W. Benson, Baltimore, Md.

Napkin Holder Made of Celluloid

Use a piece of celluloid 5½ in. in length; the half inch allows for the lap of the ends. Midway between the upper and lower corner of the ends, and ½ in. from the edge, fasten a snap button, or glove fastener, such as are used on caps, gloves, and various garments. To place the name or initial on the holder, first mark the name with pencil, then lay the celluloid strip out flat on several folds of newspaper. Press tightly, and puncture with a good-sized sewing needle, holding the needle perfectly upright, pricking the holes in the celluloid about 1/16 in. apart along the pencil lines. This makes a permanent marking, and the pencil lines can be removed with a moist cloth. Holders can be made in various shapes and sizes, and all colors. —H. N. Van Tuyl, Sr., Binghamton, New York.



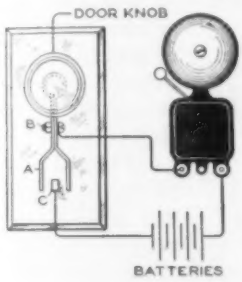
Fan Motor Drives Power Eraser

In an accounting room where many figures had to be erased, a fan motor was rigged up to do the work successfully. The blades were removed, and a flexible shaft, made of ⅜-in. heavy rubber tubing, was attached to the motor shaft. To the other end of the

tubing was attached a circular rubber ink eraser, such as may be bought anywhere for ten cents. With the motor running at slow speed, a whole column of figures could be erased neatly in far less time than with a knife.—H. S. Rich, Cromwell, Conn.

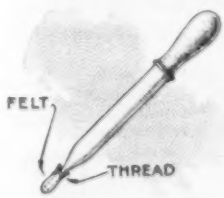
Electric Alarm for House or Garage Door

An effective electric burglar signal for any door is easily provided. A strip of copper is bent to form a fork, A, with a ring at the top that fits snugly about the shank of the door knob. A bolt and nut, B, is placed near the middle to hold the member firmly and serve as a binding post for one wire. An outwardly projecting metal strip, C, is screwed to the door at a point midway between the fork prongs. To this the other wire in the bell circuit is connected. When the knob is turned, the bell rings.



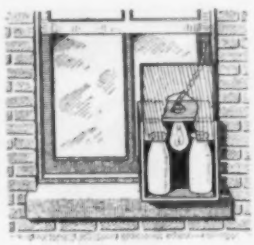
Erasing Pencil Marks with Medicine Dropper

After inking in a tracing it is advisable to remove all pencil marks from it, since they often cause confusion in the blueprints. Doing this with a rubber eraser takes time, and is likely to dim somewhat the blackness of the ink lines. To avoid this, use a medicine dropper, filled with gasoline, with a bit of felt fastened over the end, and pass the felt lightly over the pencil marks, squeezing the bulb slightly to keep the felt wet. The pencil marks will be removed, without affecting the ink lines.



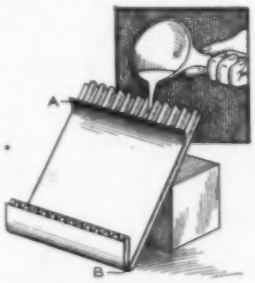
Incandescent Lamp Keeps Milk Bottles from Freezing

Milk can readily be kept cold in winter by placing it on a shelf outside the window, but the problem in the colder climates is to keep the milk from freezing solid. This can be done by keeping the milk in a wooden box, with an adjustable slide cover so that the amount of opening in the box can be regulated roughly to the weather, and containing an electric light of ordinary size, connected by a cord to the lighting wires. On cold nights the box can be completely closed, and on moderately cold ones some ventilation may be provided. The cost will be from 2 to 5 cents a night, which is much less than the cost of keeping an ice box filled in summer.



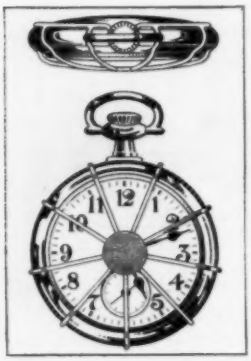
Corrugated Paper Used as a Solder Mold

Soldering operations frequently demand the use of solder which is cast in bars of small diameter. The scraps of material that are gathered and melted over for use may be readily gotten into the desired form by pouring in corrugated packing paper, as illustrated. A strip of the paper, about 2 in. longer than the bars to be cast, is used. The upper end is split down on one side, as indicated at A, to form a funnel effect for pouring the molten metal. The lower end is bent upward, as at B, to close it. After the solder has cooled, the top layer of the paper is split off to remove the bars.—Henry Wade, Chicago, Ill.



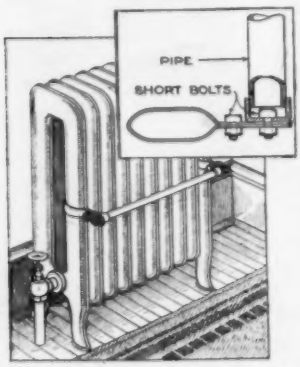
Wire Frame Protects Watch Crystal

The chief disadvantage of the modern open-faced watch is the danger of breaking the crystal. This leads many busy men to prefer the watch with a hinged cover. The addition of a wire frame to the open-face watch, however, retains its convenience and removes nearly all the danger. The frame should be made of stiff steel wire, soldered together at the joints, and soldered to a disk over the center of the watch face. The wires over the crystal should stand out 1/16 in. or more from the glass, so as to cushion any shock which they might receive. The protector may be attached to the watch by springing out the loop which goes around the stem. —M. L. Morrison, Baltimore, Md.



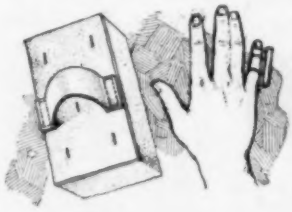
Foot Rest or Clothes Drier for Steam Radiator

An accessory for a steam radiator, whose usefulness begins with the first touch of cold weather, is the foot rest illustrated, which is also useful for hanging clothes on to dry. It is made from a piece of iron pipe, nearly as long as the radiator, two pipe caps, two iron straps, about 15 in. long, and four short 3/8 or 1/2-in. bolts with nuts. Holes are drilled through the pipe caps to take the bolts, and the straps are drilled so that screwing up the nuts on the inner bolts pulls the straps tight around the radiator. By loosening these nuts, the straps can be adjusted to any height desired. The foot rest may be enameled or painted similar to the radiator.—C. C. Spreen, Flint, Mich.



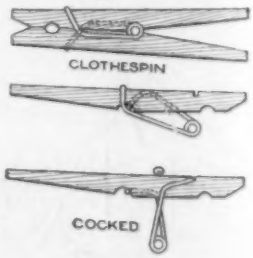
Handy Blackboard Eraser Saves Much Time

The small blackboard eraser illustrated, to be attached to the little finger whenever writing on the blackboard, will appeal especially to many schoolteachers who find that the time necessary to pick up the large eraser often cannot be spared, and therefore use the fingers to make small erasures, with doubtful satisfaction. The eraser is made from scraps of old felt, glued or sewed to a small piece of stiff leather, such as material for shoe soles. A strip of thin leather, sewed to the thick piece, is made of just the proper size to fit over the user's little finger.



Powerful Toy Pistol Made from a Clothespin

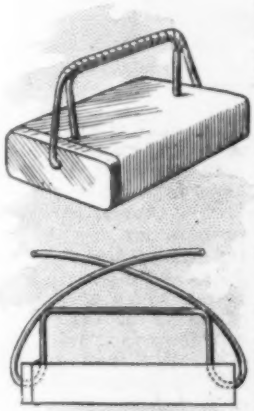
This very simple toy will give much amusement to the small boy. It is made from an ordinary spring clothespin, by removing one of the wooden pieces, cutting a small square notch, as shown, and replacing the wire spring in the position shown in the center of the illustration. The pistol is cocked by turning it upside down and pushing it against a square edge, such as that of a board, so that the end of the clip is forced



back into the notch, as in the lower sketch. A small pebble, or chip of wood, is then placed about ¼ in. in front of the notch, and when the coil of the spring is pulled back like a trigger, the missile will be shot ahead with surprising velocity. Its tendency to travel straight may be somewhat increased by cutting a slot along the wood, in which it may travel.—J. E. Church, Jr., Reno, Nev.

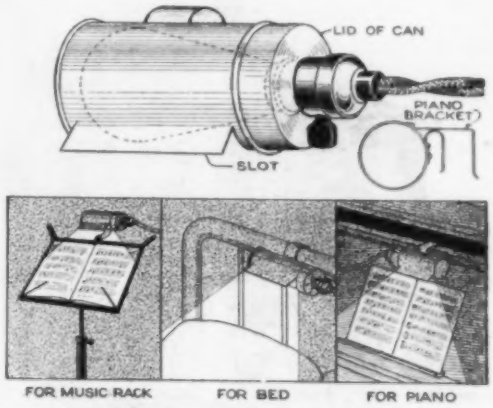
An Improvised Iron for Campers or Soldiers

A sadiron is a useful tool in camp, but is heavy to carry. A simple substitute, which can be made from materials usually available around a camp, is here illustrated. Take an empty cocoa box, and punch holes as shown; then fill the box with clay, and pass a stiff piece of wire through the holes, bending it as shown. Wrap tape or strips of rag around the wire, to make a handle. The clay will hold heat for some time, and the cocoa box provides the smooth metal surface required.—William Wallace Mackenzie, Cleveland, Ohio.



Orchestra, Piano, and Bed Light Made from Tin Can

A very good lamp for illuminating music, or for use in a bedroom, can be made from an ordinary large-size baking-powder can. The lid is first removed, and a hole is made in it of the proper size, so that a lamp socket may be soldered into it, as shown in the illustration. A slot is then cut in the can, about 1½ in. wide, and almost the entire length of the can, and the tin from the slot is bent outward, as shown. The bracket may be made of

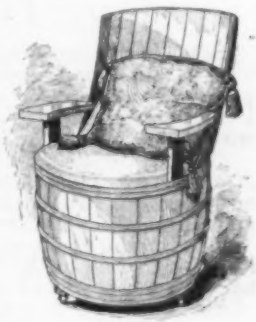


The Lamp Is a Good Imitation of Those Used in Theaters for Orchestra Music Racks

small pieces of strap iron, riveted to the can, and formed to a shape suitable for attaching wherever the lamp is to be used. A coat of aluminum or bronze lacquer will add to its appearance.—Harry Marcelle, Waimea, Kauai, Hawaii.

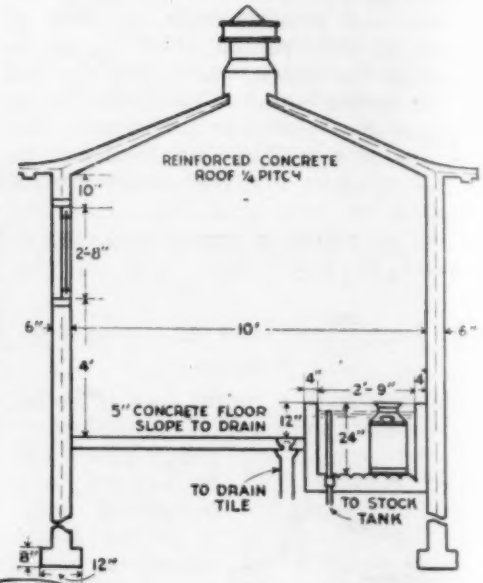
Comfortable Chair Made from Empty Barrel

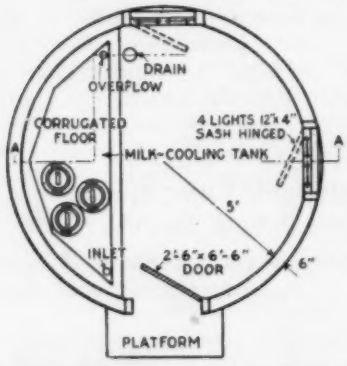
This chair, made from parts of two barrels, is quite comfortable and decidedly inexpensive. The lower half of one barrel forms the body of the chair, and the back is made from the other one. The seat is made from the bottom or head of one of the barrels, fastened to the staves with small blocks. The arms can better be sawed out of boards, with curved lines to harmonize with those of the barrels. Upholstery, cushions, paint, and four casters complete the chair. The one illustrated is in use in an elegant home in New York City.—Mary Morris, New York, N. Y.

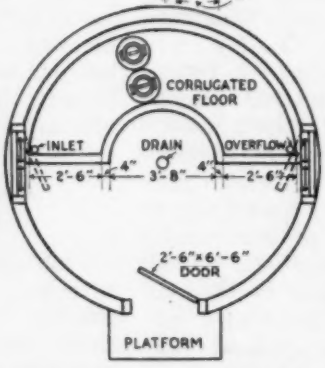


MODEL CONCRETE MILK HOUSE FOR AVERAGE FARM

A Circular Concrete Milk House, a Model of Convenience for the Average Farm: It can be Constructed for $115 to $150, Contract Price







IT is of vital importance to the modern dairyman that the milk be kept in a place that is both cool and sanitary, preparatory to shipping it. While this requirement can be met in rooms which are a part of barns or other outbuildings, it is being generally recognized that a separate house, used exclusively for storing milk, is by far the most satisfactory arrangement and the one least liable to develop insanitary conditions. For building such a structure no other material has the all-around serviceability of concrete. The milk house shown herewith has been planned especially to meet the needs of the average farmer and is a model of convenience. It can be constructed by any concrete-silo contractor, or by the farmer himself if he is provided with the necessary forms and accustomed to handling concrete.

The house is 10 ft. in diameter, and the walls are 7½ ft. high. Besides the entrance, there is a window, and a door opening onto an elevated platform where the milk cans are loaded and unloaded. The circular roof is of reinforced concrete and has a one-fourth pitch. At its apex is a metal ventilator. Two floor plans are given showing different types of cooling tanks. The one on the right accommodates the larger number of cans. Each is designed to receive its supply of water through an inlet at the opposite end from the overflow. The latter can be connected with the stock tank, making the water pumped serve two purposes. The floor of the tank has a corrugated bottom and is about a foot lower than the rest of the floor, which slopes a trifle toward a drain. This arrangement lessens the labor involved in the frequent cleanings so essential in a sanitary milk house. The foundations, like the walls, are 6 in. thick, except the base, which should be below frost line and is 12 in. broad. Built by a contractor this structure will cost from $115 to $150, according to the section of the country in which it is erected. If built by the owner the outlay will be considerably less.

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